MEASURING FAMILY PLANNING QUALITY OF CARE IN MALAWI

By

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Abstract

Problem Statement

Measuring quality of care is critical to the success of family planning programs but there is little information on the validity or reliability of measurement tools.(1,2) Respectful care, implicitly included in the definition of quality, has not been documented consistently during quality assessments. (3) This study in Malawi aimed to measure levels of disrespectful care encountered through the family planning program and simultaneously test the validity and reliability of clinical vignettes (CV) for measuring quality knowledge and practice.

Methods

We used simulated clients to measure respectful care. Simulated clients visited 112 public sector health facilities in six districts of Malawi. Immediately after the visit, the simulated clients were interviewed about the consultation. Interviewer teams later called the providers that consulted the simulated clients to administer a CV. The CV included the same two case scenarios adopted by the simulated clients. A separate sample of providers was interviewed using the CV tool in-person and later by mobile phone. We reported the prevalence of provider behaviors associated with respectful care, the validity of mobile phone based CVs using simulated clients as the gold standard, and the reliability of in-person and mobile phone CVs.

Results

The simulated clients reported instances of poor counseling, and disrespectful care. In 18% of the consultations, they experienced humiliation such as being yelled at, threatened, scolded, or insulted by health staff. The mobile phone CVs were found not to be valid measures of practice. We found poor reliability of the mobile phone CVs relative to in person CVs due to increased

prevalence of reported behaviors during the phone application, which was always administered second.

Conclusions

This study documented important instances of disrespectful care that may impact the success of family planning programs. Future quality of care assessments should aim to measure elements of respectful care. There is little evidence of CV validity for measuring quality practices, but providers did not report certain behaviors during the interview that were reported by the simulated clients during the consultation. Important biases limit the findings of the reliability study and more work is needed on whether repeated application of CVs can improve quality knowledge.

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Chapter 1: Introduction

Family planning programs and public health

Since the early 2010's, there has been a renewed global investment in family planning (FP) programs.(4) The ability of women to control their own fertility will increase their health, financial stability and is a fundamental human right. The health benefits are well documented. Limiting fertility increases intervals between births, decreases parity, and decreases the overall proportion of high-risk births (women younger than 18 and older than 34) all which will reduce population-level maternal and neonatal mortality. (5) Perinatal mortality risk is increased for birth intervals of less than two years due to maternal depletion and child mortality risk remains elevated as the children grow older.(5) Risk of excessive child mortality due to birth order occurs after seven or more births.(5) In areas without good access to obstetric services, family planning reduces the maternal and early neonatal mortality risk by reducing the incidence of deliveries. Access to contraceptives reduces unsafe abortions especially in areas where abortion is illegal. Improvements in family planning programs in areas with high fertility, high unmet need, a high number of unintended pregnancies, and unsafe abortions will have the greatest impact on mortality (5)

There are global and economic benefits to successful family planning programs. Reducing population growth will diminish the anthropometric stress on the environment by reducing consumption of resources and energy. In wealthier nations, having one fewer child is the single greatest impact on carbon dioxide emissions that can be contributed at the individual level.(6) Low and middle income countries (LMICs) contribute less to global emissions but as nations become wealthier and consumption increases, slower population growth will help mitigate local and global impacts.(4)

The demographic transition occurs when LMICs experience lower death and birth rates associated with economic development, altering the age structure resulting in more adults and fewer children. (7) This changing age structure – known as the "demographic dividend" – results in a larger work force and is hypothesized to be responsible for a portion of East Asia's economic development in the past 50 years. (8) As child mortality decreases, it is vital to ensure contraceptive needs are met now and as that generation reaches reproductive age. (9)

Finally, a woman's ability to control her fertility is a fundamental human right. In 1994 the participants of the International Conference on Population and Development (ICPD) aimed to shift the family planning focus from demographic targets to empowering women to fertility self-determination.(10) This shift was informed by the 1993 "Women's Declaration on Population Policies" created in advance of the conference.(10) The declaration laid out ethical principles and guidelines for implementing FP programs that empower women's choice including offering appropriate, affordable and quality contraceptive services, removing all incentives/disincentives to contraceptive use, ensuring wide method mix, addressing inequities, and involvement and leadership of women in organizations with representation from minority women. (11) These guidelines continue to inform global and national family planning policies and programs. The United Nations' Sustainability Goals emphasize access to reproductive health as a significant component of gender equality and improvement or health.(12)

Global contraceptive use and unmet need

In 2015, 57% of women of reproductive age and who are either married or in a sexual union were using modern contraceptives but this aggregate number masks large regional and socioeconomic differences.(13) Contraceptive use has increased dramatically in the last 50 years resulting in smaller families, however the unmet need for family planning in unacceptably high.(14) Globally,

inequities in contraceptive prevalence rates within countries have been decreasing in LMICs but have remained stagnant or increasing in sub-Saharan Africa. (15)

Table 1 describes the modern contraceptive methods typically available in LMICs. The descriptions are from the 2018 edition of the Global Handbook for Family Planning Providers.(16) The most common form of contraceptives used world-wide are female sterilization and intrauterine devices (IUD) but this is due to large numbers of users in Asia, Latin America, Europe and North America.(13) Only 33% of women in Africa are using any form of contraception and most use injectable and oral hormonal contraceptives, although implant use is increases.(13,17) There is a similar rate for adolescent women under 19 years of age in African countries, only 20-35% of married or sexually active women of this age use contraceptives, depending on the country.(18)

Table 1: A short description of modern contraceptive methods typically available in LMICs

Contraceptive	**Description**
Condom (female)	Barrier method, a sheath that fits inside the vagina and protects against pregnancy and sexually transmitted infections (STIs).
Condom (male)	Barrier method, a sheath that fits over the penis and protects against pregnancy and STIs.
Emergency contraception	Hormonal contraceptive pills taken within five days of unprotected sex to prevent pregnancy. Pills can be either combined estrogen and progestin pills, or progestin only pills
Implants	A small, flexible rod-shaped device placed surgically under the skin of the upper arm. It releases progestin to prevent pregnancy and is effective for 3-5 years depending on the type.
Injectables (progestin only)	Injectable contraceptive hormones contain progestin to prevent pregnancy. They are given every two or three months depending on the type and can be given either intramuscular or subcutaneous.
Injectables (Combined)	Injectable contraceptive hormones containing both estrogen and progestin to prevent pregnancy. Combined injectables are given monthly.
Intrauterine device (IUD)	Device inserted through the cervix into the uterus to prevent pregnancy. Hormonal IUD contains progestin and is effective for 5 years. Copper IUD does not contain hormones and is effective up to 12 years.

Lactational amenorrhea method	Biologically-induced, temporary infertility from postpartum amenorrhea. If the mother is exclusively breastfeeding her infant less than six months old and her menstrual period has not returned, there is little change of her becoming pregnant.
Pills	Oral hormonal contraceptives, can refer to either combined estrogen and progestin pills, or progestin only pills
Standard days method	A calendar-based method for avoiding sex during fertile days of the menstrual cycle by counting days since the last menses.
Sterilization (female)	Permanent method to prevent pregnancy by surgically blocking or cutting the fallopian tubes.
Sterilization (male)	Permanent method to prevent pregnancy by surgically blocking or cutting the vas deferens.

Use of contraceptives is a complex decision influenced by personal, familial, and social spheres of influence. In Sub-Saharan Africa, contraceptive prevalence has been associated with a variety of factors including woman's age, education, marital status, religion, household wealth, number of surviving children, exposure to media, urban/rural place of residence, empowerment for making decisions and couple-related fertility discussions.(19–21) The contraceptive prevalence rate indicates overall use but unmet need for family planning services has emerged as a key output as programs have moved towards empowering women to control their fertility. (10) Unmet need is defined as the proportion of women who want to limit or space births who are currently not using contraceptives. It can be used to generate aggregated estimates that indicate what the contraceptive prevalence would be if every woman had their contraceptives goals met. It does not take into account a women's desire to use contraceptives, it only shows the gap in fertility preferences and use of contraceptives. (10) In LMICs, only half of women have their demand for FP satisfied and there is significant variations across and within countries. (22)

Many women will initiate contraceptives but then discontinue for a variety of reasons including desire for pregnancy, method failure (accidental pregnancy) or method-related reasons (side effects/health concerns). (23) On average, 36% of women will discontinue injectables after one year of use, followed by condoms (29%) and oral contraceptives (28%).(23) After three months,

on average, 45% of couples who discontinued due to method-reasons switched to another modern method, 15% to a traditional method while 26% do not use any method. (23)

Annually 16 million women under the age of 20 give birth and 95% of these births occur in LMICs.(24) These young women are more likely to experience negative health outcomes for themselves and their babies compared to mothers 20-24 years of age.(25) Successful strategies for reducing adolescent pregnancy involve increasing girls' education/literacy, minimum age of marriage laws, and social and community mobilization among others. (26) There are well documented barriers to use at the provider level. Minimum age restrictions - or the youngest age in which providers are willing to give contraceptives have been documented in several LMIC settings. In Nigeria, minimum age bias (age 15 or older) was reported in 70-90% of providers, depending on provider type and method. (27) In Senegal, the median minimum age for which public providers reported they would not supply contraceptives was 17 years old for pills, 18 years old for most other methods - as high as 20 for implants. (28) Minimum age restrictions were documented in over half of urban-based providers in Kenya.(29) Establishment of youth friendly family planning programs to increase utilization have been implemented in several settings. Evaluations have found that they are most effective in concert with other interventions such as community mobilization and education but are an important piece in increasing agency of young men and women to control their fertility.(26)

In general, tremendous progress has been made since the 1994 ICPD conference but continued investments in family planning programs will improve the health and quality of life for millions of women and children. There are equity issues in access, use and demand. There are low rates of use among adolescent girls and unacceptably high unmet need. Method failures and discontinuation due to method-related reasons can be reduced by FP programs. In the next section, I discuss how quality of care provided by FP providers may impact program success.

Quality of care

Public health officials are interested in quality of care (QoC) for two reasons. One is that it is a fundamental human right to have access to appropriate and acceptable levels of quality health care. The second is that providing quality services improves utilization, leading to higher intervention coverages and improved health impact.

Using the Donabedian quality framework, QoC is measured through an observation-based assessment of how well health care is being provided (process) and client knowledge/satisfaction (outcome).(30) The structural aspects of quality (training, drug stocks, others) are defined as *readiness*. In general, readiness is considered one component of overall quality as in the World Health Organization (WHO) building blocks model for health systems strengthening(31) and a separate but linked component of the common evaluation framework.(32) Service readiness is a prerequisite but does not guarantee quality services and the tools for measuring readiness and QoC are different. This dissertation focuses on FP QoC as a distinct component from service readiness, recognizing that both are outcome measures according to the common evaluation framework.

Quality of care and family planning

In response to increased attention on FP in the late 1980's and ambiguity around the definition of service quality, Judith Bruce proposed a framework for evaluating quality of care for FP programs.(33) Bruce recognized quality FP services are more than decent clinical services, the client experience plays a larger role in program outputs compared to other health programs. At the time, there was a "strong bias to evaluate performance based on volume of activities" (i.e. readiness) and information on quality of counseling or dignified care (i.e. quality of care) was

reported through "accounts of personal experience or trip reports". She developed a framework that combined both aspects that is still the standard for today.

Recently other provider-level frameworks have been proposed that expand the Bruce framework to include more human-rights based elements such as ensuring equitable services, protecting client dignity, and informed client consent.(34,35) Table 2 shows the framework used for this dissertation that includes elements from the Bruce, Harris and International Planned Parenthood Federation (IPPF) frameworks.(3,33,35)

Table 2: Domains within the Bruce framework included in dissertation

Domain	Description
Program effort: Not included in this dissertation (includes inputs that will not be measured as part of the study)	
Elements in the Unit of Services Received	
Choice of methods	This domain included range of methods available at the service point (readiness) and client-led informed choice (quality of care). This is distinct from quality of counseling (covered in the next domain) in that the provider should not aim to influence client choice unless there is a medical contraindication. This domain includes elements of informed consent, i.e. the provider should provide all information relevant to the client's history and reproductive goals.
Information given to clients	Information given to clients includes identifying a suite of suitable methods based on client history, preference and medical exam, counseling of correct use, and explanation of side effects.
Interpersonal relationship	This domain is separate from the "information given to clients" in the previous domain and instead focuses on how that information is provided. It includes client-centered communication such as answering all client questions, working with clients to resolve unwanted side effects or issues with adherence, and presenting a welcoming attitude. Client-provider interactions should be respectful, free from judgement and abusive language, and confidential/private. Clients should be consented before any procedures or exams.
Follow-up/continuity mechanism	This domain includes some structural components like clinic hours, continued supply of contraceptive but also includes provider-level components, i.e. telling the client when they should return and/or setting a time to return.
Technical competence	This domain includes two components:

	Clinical competence related to quality clinical procedures including adherence to protocols, sterility, cleanliness, and obtaining consent for procedures. Provider knowledge of correct counseling techniques, contraindications, side effects and biological mechanisms of all provided contraceptives.
Appropriate constellation of services	Not included in this study. This is related to services readiness – the method mix available to clients and the health facilities, appropriateness of service delivery (vertical versus integrated services) and whether the program fits the community context.
Impacts	
Client knowledge	This includes correct client knowledge of reproductive health/pregnancy, and the use, side effects and continuity mechanism for the method they were prescribed/given.
Client satisfaction	Client satisfaction with the care received includes general satisfaction with the consultation, accessing care at the facility, waiting times, perceived confidentiality/privacy, and method received.
Client health and method continuation	Not included in this study.

Evidence of the impact of quality of care

It is generally recognized that quality of FP care can impact "demand satisfied" by increasing continuation rates for current users, reducing the number of method failures, and attracting new users through social diffusion processes. Desire for more children is a personal choice but method failure and discontinuation for method-related reasons could be due to quality of care: whether the client received correct information on use and side effects, whether the provider set up a continuity mechanisms like follow-up visits, whether the care was respectful and dignified, and if there was client agency in the choice of methods. If we assume these women still want to limit pregnancy, improving counseling and experiential quality may address this gap in unmet need. Clients satisfied with their reproductive goals may encourage others to seek family planning services.

The evidence for the link between quality of FP care and contraceptive use/continuation is less straightforward. Several studies have shown women who report receiving higher quality services are more likely to continue contraceptive use.(36–38) However client satisfaction does not seem to be related to quality of counseling or any other provider-level measurement.(39,40) In 2016, a systematic review of 11 moderate-to-high quality research studies on factors relating to client satisfaction found no one factor strongly related to satisfaction, indicating a complex relationship.(41)

Evidence of the impact on care actually received (not just perception of care or satisfaction) is mixed as well. Most of the literature has focused on readiness. Studies in Vietnam and Egypt showed that structural quality does not impact method discontinuation. (42,43) A panel study in Morocco showed that drug availability was associated with increased use of contraceptives for women who intended not to use family planning at baseline. (44) Studies that geographically link individual women with nearby health facilities in Egypt, Peru and Tanzania found a statistically significant effect of readiness on current contraceptive use. (45–47) A study in urban Kenya that linked women to facilities they reported accessing for other health issues, found an association between client satisfaction but not provider knowledge and current contraceptive use.(29)

Additionally evidence on the effectiveness for quality of counseling interventions has shown mixed results on method continuation, leading some to conclude this aspect of quality is "necessary but not sufficient" to reduce discontinuation. (48) In a literature review examining the relationship between quality of care and FP outcomes, Abdel-Tawab & Rama Rao argue this lack of consistency is related to differences in study design, strength of the interventions implemented and social and health system contexts. (48) There are different definitions of QoC and different tools used to measure it. This lack of consistency could simply be due to the complex nature of how people perceive quality and its impact on their behavior.

In summary, the relationship between quality of care, either defined as readiness, provider-level care, or client satisfaction, and FP outcomes is mixed. There are a plurality of tools to measure QoC but more work is needed test the validity of these tools to develop standardized methods and measurements.(49,50)

Respectful care

Although human-rights based, respectful care is identified as a critical component of family planning services, there are few tools that collect information on this. The concept of respectful care has been explored in maternal health around delivery and has similar applications to family planning. (3,51,52) Respectful care in FP is defined as the provider encouraging women's agency in method choice, freely providing information and answering client questions (consensual care), and judgement-free and non-abusive language.(3) A study in Uganda using simulated or "mystery" FP clients showed that only 31% of the simulated clients received their (study assigned) method choice and in 4% of interactions the provider raised their voice or shouted at the simulated client. (53) A simulated, adolescent client study in Senegal showed difficulty accessing the providers and unwelcoming attitudes once at the facility, i.e. being told to go to different department or the pharmacy for assistance.(54) During the consultation, the provider tried to dissuade them from contraceptive use by telling them to focus on school or delay sex, highlighting the importance of virginity, and stating they were too young for sex. (54) None of the simulated clients who asked for information on contraceptives or contraceptive supplies were given it. (54) Having a reliable measurement of respectful, dignified care can help program implementers address any deficiencies in provider training or supervision.

Methods for measuring family planning quality of care

There is no standardized tool or method for measuring FP QoC in LMICs.(50) It can be measured by direct observation of patient-provider interactions, patient exit interviews, simulated client, provider test, and record review. However there is very little information on the validity of these methods and most involve field-based data collection which is expensive and time-consuming. A recent study examined the validity of several methods using simulated clients as a gold standard but small sample sizes limited the conclusions.(1) This dissertation focuses on the use of clinical vignettes and simulated clients to measure FP QoC.

Clinical vignettes have been used in high income countries to measure provider knowledge and clinical practices for decades.(55,56) Providers are given a standardized description of a fictional patient presenting for care and based on this information they provide a diagnosis, management plan and/or treatment. Because clinicians are given the same information (i.e. patient history, test results, etc.), their responses and conclusions can be compared across providers. Clinical vignettes are ideal for measuring process quality since they account for differences in patient mix and reduce the effect of structural quality (i.e. drug stockouts). (56)

Additionally clinical vignettes can be used to capture unnecessary or harmful care. Compared to questionnaires to measure provider knowledge, clinical vignettes may be a more accurate representation of the actual care provided. They allow for open-ended responses and ask the provider to respond not based on their knowledge of clinical/practice guidelines but to respond when presented with a patient like they might encounter during their practice. (55) Studies in the United States showed that clinical vignettes were an adequate proxy measure of physician practice using simulated clients as the gold standard. (56,57) Clinical vignette in-person surveys have been used in LMICs to assess quality maternal and child health and family planning. (2,58,59)

Simulated, "mystery" clients adopt an assigned case scenario and then present to a provider for care. The simulated clients are carefully trained on the details of their assigned scenario, creating subterfuge and how to avoid any unwanted clinical procedures. After the interaction with the provider, the simulated client completes a checklist documenting the interaction. Elements of QoC can be recorded such as patient history, physical exam, diagnosis, management plan and recommended treatment. Simulated clients – if they are not detected by the provider – provide a more accurate measure of QoC compared to observation of consultation by an assessor through elimination of bias due to interactions of providers and assessors– also known as reactivity bias. (60) Providers will not change their behavior because they do not realize they are being assessed. A review of simulated client studies in high income countries found there is high inter-actor reliability or multiple actors can be trained to portray the same simulated client.(61) And there is high accuracy of reporting by the simulated clients.(61) Simulated client protocols have been used to assess FP QoC in LMICs for decades.(53,54,62,63)

These methods for measuring QoC involve field-based data collection which is expensive and time-consuming. Mobile phone use has burgeoned in LMICs, opening up a new field of mobile health (mHealth) for global health. For QoC, mobile phone interviews have been used to measure drugs stocks and supervision for treatment of childhood illness in Malawi.(64) These mobile phone interviews were found to be valid and less expensive alternatives to field-based data collection.(65) This technique could be applied to measure provider knowledge of quality care practices over phone and see if it relates to knowledge collected in-person and actual quality of care provided. If mobile phone interviews are a decent proxy of care provided, this would a feasible method for LMICs to scale-up for routine monitoring.

Chapter 2: Malawi family planning landscape analysis and the "Parent" project

The Real Accountability: Data Analysis for Results (RADAR) project is being implemented by the Institute for International Programs at Johns Hopkins University (IIP-JHU). Through the project, IIP-JHU works with Canadian institutions/organizations, in-country evaluation partners, country governments, and development partners in several countries with Canadian funded activities to develop, implement, and refine tools and approaches to strengthen country programs in reproductive, maternal, newborn, and child health and nutrition (RMNCH&N). JHU-IIP will also provide technical assistance to Global Affairs Canada (GAC) and Canadian implementing organizations in analyzing data and using findings to drive evidence-based decision-making and increase the availability of reliable data to assess the impact of GAC funding on improving reproductive, maternal, and child health.

RADAR will develop six tools to facilitate planning and evaluation of RMNCH programs: (1) a program planning tool; (2) an impact modeling tool; (3) a coverage measurement tool; (4) an implementation strength measurement tool; (5) a quality of care measurement tool; and (6) an overall evaluation and accountability measurement tool. This dissertation was embedded in an implementation of RADAR tool 5 in Malawi to evaluate the national, public-sector family planning program.

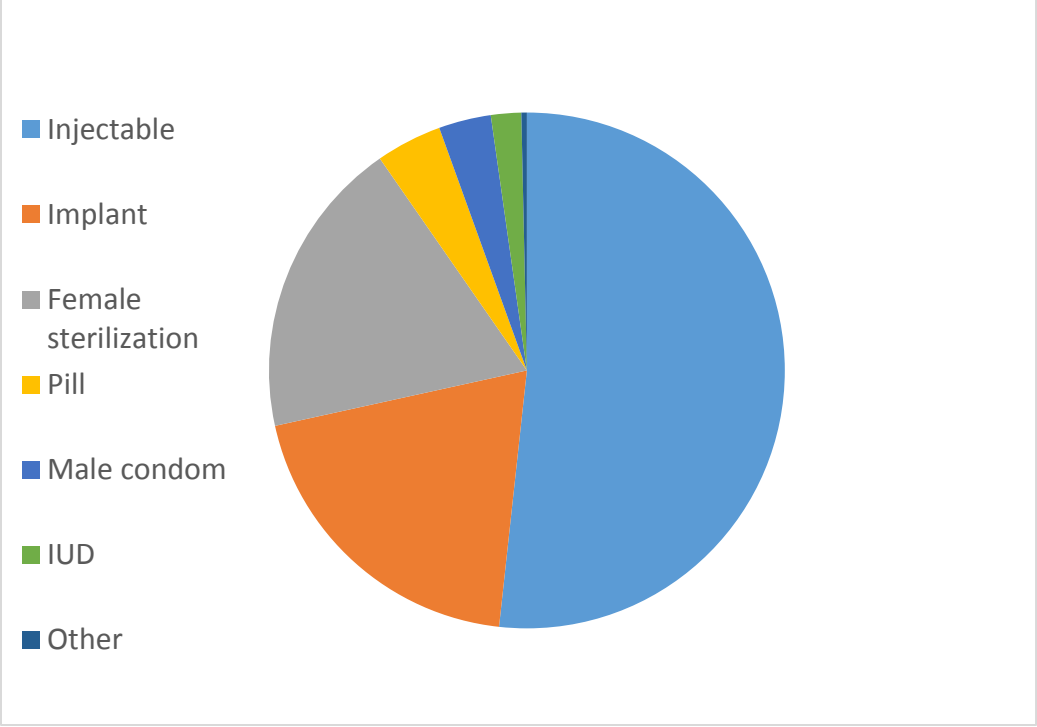
Malawi context

The total fertility rate (TFR) in Malawi has decreased from 5.7 in 2010 to 4.4 children per woman in 2015. (66) However, a third of women under 24 have begun childbearing and that group has the lowest modern contraceptive prevalence rate (31%). Women 15-19 years old have lower demand satisfied for family planning services (62%) compared to women 20 years and older (75%).(66) According to the 2015 Malawi DHS, the median age of marriage for women 25-49 years

of age is 18.2 and the median age for first sexual intercourse is 16.8. This indicates adolescent girls are sexually active before marriage and are therefore in need of adequate access to family planning services. Only a third of sexually active unmarried women between 15 and 19 years of age are using modern contraceptives.(66) Given the demographic "youth bulge" present in Malawi and other demographic transitional countries, it is vital to increase met need for family planning services for all women, especially for youth.

The 2015-2016 Malawi Demographic Health Survey (DHS) reports 58% of married women were currently using some form of modern contraceptive. Injectables were predominantly used (30%), followed by implants (12%), female sterilization (11%), pills (2%), male condom (2%), and IUD (1%) (fig. 1).

Figure 1: Modern Contraceptive Mix, among married women, Malawi DHS 2015-16



Eighty percent of modern contraceptive users in Malawi receive their methods from public sector sources.(66) Assessing the quality of care and clinical services provided through the public sector

will provide the government of Malawi an evidence base for program improvement. Additionally there is no source for subnational quality of care in Malawi despite evidence of variation in the TFR (range 3.3-6.5) and the proportion of women with unmet need (range 11% - 29%) by district (reanalyzed DHS 2015).

In 2009, Malawi updated its National Sexual and Reproductive Rights and Health policy and committed to providing reproductive health services with a focus on a human rights-based approach, community involvement, and evidence-based decision making.(67) This is implemented through community-based counseling and distribution of commodities (68) with a renewed focus on providing youth-friendly family planning services. (69) FP services are funneled through common platforms of delivery: the health facility, with its linkage to health surveillance agents (HSAs), and community-based distribution agents (CBDAs). HSAs operate out of village-based health centers and CBDAs are located in the communities they serve. HSAs are trained to counsel, assess and provide condoms, pills, and injectables to new and returning clients. CBDAs provide condoms and pills to new and returning clients. Both cadres refer clients to the facilities for other contraceptives or additional procedures or exams. Three job aids are primarily used: a balanced counseling strategy algorithm, counselling cards and method brochures. (70)

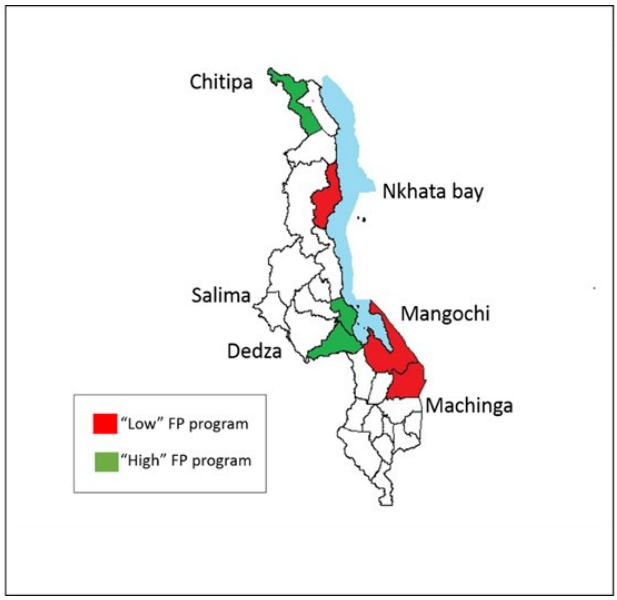
Providers are mandated to offer family planning services to all clients. Qualitative work in Malawi related to this study shows that adolescents report discrimination when accessing family planning care due to their age and marital status.(71) Despite this, sixty percent of youth access family planning through a government facility. (69)

Parent Study

Research question and aims

The parent project provided comparative estimates of family planning QoC for six high- and low-performing districts in Malawi (fig. 2). We tested the validity of several family planning quality of care measurement tools, and developed and implemented new tools on measuring respectful care.

Figure 2: Six districts of the parent study by high-and-low outcome grouping



The aims of the parent study were:

1. To compare the QoC for FP services in two sets of "high and low performing" districts.
2. To compare several methods for measuring QoC from facility and community-based FP providers including direct observation, client exit interviews, clinical vignettes and provider interviews, and simulated clients.
3. To develop and test modules that measure respectful, human rights-based FP services.

The detailed aims, methodology, findings and implications of the parent study will be documented in an upcoming publication. Here I give a brief overview of the methods so the reader may understand how the dissertation links to the parent study.

Methods

Design and protocol/tools

The parent study was a cross-sectional survey of FP providers working in the formal public health sector in Malawi. A set of high-and-low FP outcomes districts were purposively selected based on TFR, modern contraceptive prevalence rate (mCPR), unmet need, and proportion with demand for FP services satisfied (DFPS) based on data from the 2015 DHS. To control for confounding due to urban/rural and religion, the districts in the two groups were selected to be similar with regards to proportion of rural households, women's education, religion, number of facilities per population, and poverty. We measured quality of care for FP in both groups and any statistical differences found will be evidence that QoC is driving the discrepancy in FP outcomes.

The parent study collected data using structured interviews and clinical vignettes tools, observation and documentation of a FP consultation by an assessor ("direct observation"), client exit interviews and a simulated client (SC) protocol. The study included four protocols: (1) simulated client protocol; (2) in person survey protocol; (3) direct observation; and (4) mobile phone survey protocol. A short description of each protocol is listed below.

Stage 1: Simulated client (SC) protocol

The SCs adopted a clinical vignette and visited selected health facility based providers seeking family planning services. HSAs and CBDAs were not tested via the simulated client protocol. They offer services within relatively small communities and the risk of unmasking the simulated client would be too high. The simulated clients adopted one of two case scenarios. After the visit, they were interviewed and de-briefed by their supervisor. Further details on this protocol are outlined in papers 1 and 2.

Stage 2: in-person survey protocol

All selected providers were interviewed using the structured questionnaire on counseling knowledge. HSAs, CBDAs and selected facility providers were tested via clinical vignette. We collected background information on the respondents such as education, gender, employment history and others.

Stage 3: Direct observation protocol

For providers that see more than 30 FP clients per month, interviewer teams aimed to observe at least one client interaction (maximum of five) and conduct client exit interviews. Clients who were observed receiving care by the study team were asked to complete a client exit interview. Audio-CAPI (computer assisted personal interviews) was used to collect client satisfaction data to reduce the likelihood that clients may report better satisfaction than they actually experienced (courtesy bias). Clients were also asked about their knowledge and general background characteristics.

Stage 4: Mobile phone survey protocol

Selected facility providers, HSAs and CBDAs were interviewed by mobile phone. The interview tool had two modules: one with a structured interview and a second for clinical vignettes. Both modules aim to test knowledge of correct counseling techniques. Further details on both the in-person and mobile phone clinical vignette tools are outlined in papers 2 and 3.

Study population and site

The study site was the six districts selected for inclusion in the project. Urban and rural facilities in the selected districts were included in the sampling frame. The study population was trained family planning providers including health facility providers, community-based providers and clients seeking care from a study facility.

Sample size

For papers 1 & 2, I used the available sample from the parent study. For paper 3, the parent study was able to increase the sample of health providers interviewed by clinical vignettes in-person and by mobile phone. In this section, I provide the sample size calculation for the parent aims and the expanded sample for paper 3.

The primary indicator for the parent study was overall quality of care based on the method prescribed/received. The indicators of interest were counseling quality, knowledge of correct counseling procedures and quality of clinical procedures, depending on the respondent type. Sample sizes were calculated to detect a difference of twenty percentage points (pp) between the high and low performing district groups.

Figure 3: Design effect formula

$$Deff = 1 + (M - 1)\rho$$

The design effect (DEFF) shows the amount of variation introduced by the sampling design (fig. 3). In the Malawi 2013 Service Provision Survey (SPA) the intracluster correlation coefficient (ICC) for proportion of providers with at least one client correctly counseled was close to zero when we examined clustering at the district levels.(72) For calculating kappa agreement, we expected a high agreement between the in-person-and mobile phone-administered clinical vignettes. We choose a kappa of 0.8 with an absolute precision of 0.15. According to the 2014 SPA, the proportion of quality interactions is low so we expected a lower proportion positive rating.(72) Table 3 shows the detailed assumptions and final sample size for each study participants followed by a detailed description for each calculation.

Table 3: Sample size and assumptions for four samples of the parent study

No.	Purpose/Indicator	Total sample size	Assumptions
A.	Purpose: Measure quality of counseling at the facility level in the 2 groups through simulated client protocol. Indicator: % of providers with correct counseling based on method	**Health facility Providers** n=205	Two sample, Chi2 80% power, 0.05 alpha P1=0.5; P2=0.7 DEFF =1.0 Non-response = 0.05
B.	Purpose: Measure quality of counseling at the community level in the 2 groups through in-person clinical vignettes. Indicator: % of providers with correct counseling based on method	**HSAs and CBDAs** n=358	Two sample, Chi2 80% power, 0.05 alpha P1=0.5; P2=0.7 DEFF = 1.6 Non-response = 0.2
C.	Purpose: Measure quality of care at the facility level in the 2 groups through direct observation and client exit interview Indicator: % of providers with correct counseling based on method	**CLIENTS**: n= 409	Two sample, Chi2 80% power, 0.05 alpha P1=0.5; P2=0.7 DEFF = 2 Non-response = 0.1
D.	Purpose: Reliability of phone-based and in-person clinical vignettes Indicator: % of providers with correct counseling based on method (SPA 2013, decreased by 10pp)	**Health facility Providers** n=214	Expected kappa statistic=0.8 % positive by rater 1 = 0.1 % positive by rater 2 = 0.1 Absolute precision = 0.15 Alpha = 0.05 Non-response = 0.2

A. Health facility providers – simulated client protocol to measure QoC: We selected only one FP provider in each facility, therefore no DEFF was required in the calculation. When listing facilities, we found only 112 public sector facilities that offer FP services in the six districts, so all were included.

B. HSAs/CBDAs: The community health workers are assigned to a catchment facility and receive supervision, mentorship and supplies through that facility. The number of community workers varies by health facility. At each facility, we interviewed 3-4 community based health workers within the facility catchment area. The 2013 SPA does not provide an ICC for community health workers so we assumed the same ICC as the clients ($\rho = 0.4$) which gives us a DEFF of 1.6. Because we were attempting to track

down community workers who often work in remote areas, we calculated sample size with a non-response rate of 20%.

C. Clients: In the Malawi 2013 the ICC for the proportion of clients corrected counseled was 0.4, a design effect of 2.0 if we limit observations to five clients per provider. We assumed non-response would be 10%.

D. Health facility providers – in-person clinical vignette protocol: multiple providers were selected per each facility and were different from those selected for the simulated client. No DEFF is required since the aim is to compare the responses from the in-person clinical vignettes to the mobile phone clinical vignettes.

We included all public sector facilities offering FP services in the six districts. The community provider sample was allocated equally between the HSAs and CBDAs.

Pretest of tools

All protocols/tools were pretested in non-study clinics in November 2017. We collected information on the feasibility of tool administration, clarity of the questions and captured any additional responses to questions that could be pre-coded. The case scenarios included in the clinical vignettes and adopted by the SCs were assessed for cultural and clinical appropriateness.

Recruitment of staff

We partnered with a Malawi-based data collection firm for the staff recruitment, tool piloting, training, and data collection. Local staff with experience in survey data collection were recruited for the study including coordinators, supervisors and interviewers. All staff were fluent in Chichewa and English. Family planning coordinators – the heads of the district-level government FP programs – were recruited from non-study districts to conduct the direct observations.

Training

Training took place from January 8th – 19th, 2018 in Zomba, Malawi and we trained 40 interviewers and the six District FP coordinators. We selected staff for the field data collection for six teams: one supervisor, two simulated clients and two interviewers per team. One District FP coordinator joined each of the six teams. The excess staff were retained for the mobile phone interviews and as alternates. We hired a consultant with experience in training SCs to conduct a one-day training on client simulation and a senior government representative conducted a half-day training on the Malawi FP program. The mobile phone interview training was conducted over two days in February 2018 and included those who attended the full training but not selected for field data collection. Both trainings included lectures, practice, role plays and a pilot with non-study FP clinicians. Additional details on the simulated client and clinical vignette training are available in each paper.

Data collection

Data collection occurred in two phases: the field based and the mobile phone based phases with the field-based phase first. Initially each of the six teams deployed to the districts. They visited the District Health Offices for orientation and permission for the study. The Offices provided a listing of clinics that offer FP services. The teams then visited each of the clinics for orientation and permission and developed a list of providers that offer FP services at each of the clinics. All selected providers were contacted via mobile phone for recruitment and verbal consent. Additional information on ethics is detailed in the papers. Shortly afterwards, the field teams deployed to all selected providers who consented to the study for the field-based portion. Further details on data collection are available in each of the three papers.

Ethics

Approval for human subjects research was obtained from the National Health Science Research Committee in Malawi, FWA# 00005976 and the Johns Hopkins Bloomberg School of Public Health in the United States, FWA# 0000287**.** All facility based providers in the six districts were called prior to data collection for a verbal consent process. The consent script contained information on the research purpose, voluntary participation, possible risks and confidentiality. If they agreed to the study, the form stated they would be visited by a masked, simulated client in the next three months, among the other study activities. The community based providers were verbally consented either by mobile phone or in person.

Analysis

We used Open Data Kit (ODK) for electronic data capture and Android tablets for data entry.(73) The data were cleaned in R, and analyzed in Stata 14.2.(74,75) For the parent study, we reported the proportions and 95% confidence intervals, and chi^2 tests were used to detect any statistically significant differences between the two groups of high and low outcome districts. We triangulated the quality indicators as measured by simulated clients, direct observation and client exit interviews to document and quantify any differences between the tools.

Chapter 3: Introduction to dissertation

In the following chapters, I present an introduction, methodology, results, discussion and conclusions separately for each of the three dissertation aims, followed by a concluding section that pulls together the information and discusses the public health implications and areas for future research. All papers were embedded in the parent study of quality of care in six districts of Malawi.

Specific dissertation aims

1. **Measuring respectful care**: This aim documented and quantified the level of respectful, dignified family planning care provided in Malawi. This involved development, piloting, and implementing a checklist that measured respectful care through a simulated client protocol.
2. **Validation study of clinical vignettes:** For this aim, we developed, implemented and tested the validity of clinical vignettes for measuring quality family planning provider care. The clinical vignettes were validated by the simulated client protocol.
3. **Reliability study of in-person and mobile phone-based clinical vignettes:** To test whether clinical vignettes can be administered by mobile phone to providers as a routine measure of quality of family planning care. The mobile phone based clinical vignettes were compared to the in-person administration of the clinical vignettes.

Aim 1 documents and quantifies respectful care based on current frameworks emerging from studies in maternal care and delivery. Researchers documented significant levels of disrespect and abuse from health providers during delivery and many hypothesized a similar framework can be applied to family planning.(3) We used the simulated client protocol for this measurement to minimize reactivity bias.

Aims 2 & 3 are linked. There are a plethora of methods for measuring family planning quality of care but limited information on the validity and reliability of such methods. (1,2) Clinical vignettes may be used as a proxy for quality practice if reported knowledge of care by the providers is associated with their actual practice. In Aim 2, we validated clinical vignettes administered to providers who were also visited by simulated clients. The simulated clients adopted the same case scenarios as administered to the providers during the clinical vignettes, facilitating a direct comparison of knowledge versus practice for the providers. Clinical vignettes administered by mobile phone would be more feasible and inexpensive for MLICs to implement for routine monitoring of quality. In aim 3, we tested the reliability of mobile-phone based clinical vignettes compared to in-person interviews about the same clinical vignettes.

Aims 1 & 2 use the same sample of providers. Because the simulated clients must be undetected to be successful in avoiding reactivity bias, we selected only facility-based providers for aims 1 & 2. All three aims use the same case scenarios. To minimize exposure to the case scenarios, we selected a different sample of facility-based providers for aim 3. The aim 3 sample also includes HSAs and CBDAs. None of the three aims distinguish between the high-and-low family planning outcome district groups.

Finally we present a few notes on the presentation of each of the three aims. In the following chapters, each aim is presented as a separate publication and is meant to be a stand-alone paper. Some information especially the background and methods is repeated from this introduction section and other chapters as a reminder to the reader.

Timing of parent study and the dissertation

At the time this dissertation was submitted, the parent study preliminary analysis was completed but the findings require review and feedback from the government of Malawi. In this dissertation,

we used global indicators of quality of care that are reflective of the Malawi national program. Malawi has sexual and reproductive health service delivery guidelines that outline the aspects of quality care but because these are national guidelines, some of the information is not detailed down to the granular level of a specific client scenario.(70) In May 2019, we will hold data workshops with the Reproductive Health Directorate of Malawi for their review and feedback on whether these provider behaviors when presented with specific clients are reflective of their guidelines and can therefore be considered quality. Until then, especially for papers 2 & 3, we refer to "provider behaviors" without attaching the "quality" label to them.

Chapter 4: Paper 1 - Documenting disrespectful care during family planning consultations

Background

Access to family planning services improves health, increases financial stability and is a fundamental human right. In 2017, it was estimated 214 million women living in developing areas wanted to limit births but were not using modern contraceptives. (76) Women with unmet need will account for 84% of unintended births, many of them will not receive essential antenatal or perinatal care.(76) Providing high quality care can increase utilization of services, meeting the family planning needs of women and families. Also quality of care is a human right as reflected in the current global health strategies of universal health care, and the Sustainable Development Goals. (12,77,78)

The key components of quality family planning care have been recognized for decades. Bruce's seminal framework includes the interpersonal relationship between provider and client, supportive environment for client choice of contraceptive methods and quality information give to the clients. (33) Since published, the framework has been further delineated to include "person-centered" care with an emphasis on respect and dignity of the clients. (52,79) Recently negative experiences were globally documented in maternal health and delivery including verbal abuse, lack of privacy, non-consented care and discrimination. (80) Given the sensitive and political nature of family planning services and the strong social norms around fertility and women's agency in contraceptive use, there may be a similar application of a disrespectful care and abuse framework for family planning. (9)

Respectful family planning care includes support for women's agency in contraceptive method choice, providing complete and accurate information, and judgement-free and non-abusive language. (3) Respectful care can increase utilization of family planning services and is also a basic

human right. Client satisfaction and quality counseling are linked to increased contraceptive use. (37,48) Judgmental treatment or abuse may dissuade clients from seeking family planning services, although there is evidence that disrespectful care by providers may be so universal the client does not think it is unusual. (81,82) Documenting and reporting aspects of respectful care helps program implementers and policy-makers identify structural or provider-level issues to target for program improvement and increased health outcomes.

This study aims to explore respectful care for adult and adolescent women accessing family planning in Malawi. In Malawi, the proportion of married women with unmet need has declined from nearly 40% in the mid-1990s to 19% in 2016, indicative of an effective national family planning program. (66) However, unmet need for young women (15-19 years old) who are married or sexually active is higher compared to older women.(66) Qualitative work in Malawi shows that adolescents report discrimination when accessing family planning care due to their age and marital status.(71) The 2009 Malawi National Sexual and Reproductive Rights and Health (SRRH) policy committed to providing reproductive health services with a focus on a human rights-based approach and providing youth-friendly services.(67,69) However, the higher unmet need among young women may be due to provider-level factors such as respectful care. Having an estimate and description of instances of disrespectful care may help the Malawi government understand, and if necessary, improve implementation of its SRRH policy. The aim of this study was to determine the prevalence and document specific interactions of disrespectful care experienced by Malawian family planning clients.

Methods

Simulated clients (SCs) were used to measure respectful care. SCs are actors who adopt the persona of a person seeking health services in order to document interactions with health providers without the provider knowing they are being evaluated. The study site was six “parent

study" districts in Malawi. The study population was trained FP providers working out of a health facility. The parent study visited all eligible clinics in the six districts (n=112) and all were included all in this analysis. One provider was visited per clinic.

Tool development

We conducted a literature review of published frameworks of disrespectful care and abuse and identified the Harris et al. framework as most relevant to the study(3). Using this framework, we defined four domains of disrespectful care: poor client-centered care, non-private consultations, refusal of care and non-dignified care with related constructs and indicators. We developed a quantitative checklist with pre-coded responses and translated it into Chichewa, the predominant language in Malawi. Any additional, relevant information not captured in the quantitative tool was documented in qualitative field notes. Appendix A shows the specific questions from the checklist mapped to the indicators and constructs for each domain from the framework along with notes on development and sources.

Training, Ethical Considerations, and Data collection

The simulated client actors adopted one of two case scenarios. The case scenarios are detailed in Appendix B and were developed based on FP training materials. (83–85) One case scenario is an adult, married woman switching methods from injectables to pills. The other is an adolescent, unmarried woman who has just become sexually active, has never used contraceptives and prefers to use pills. The SCs were trained to avoid all clinical procedures. They participated in a one-day training on client simulation and subsequent practice, role plays and a pilot in a non-study clinic.

Data collection was carried out from January through March 2018. Teams deployed to the first clinic 1-2 days after the consenting was complete. One provider at the clinic (whoever was

providing FP services on the day of SC deployment) was visited by two SCs, one "Adult" and one "Adolescent". Both the SCs arrived at a facility on the same morning, traveling separately. As trained, the SCs released the information from their assigned case scenario when asked by the provider in order to mimic an actual consultation. All SCs presented as clients accessing the particular study clinic for the first time. When the consultation was complete, the SCs left the clinic and were interviewed as immediately as possible by the study supervisor using the SC checklist. After the SC checklist was complete, the supervisor returned to the clinic to interview providers on their background characteristics, education and professional status.

Data Management and analysis

We reported the prevalence of disrespectful actions by domain and construct. Standard errors and 95% confidence intervals were calculated assuming a binomial distribution and no design effect. The field notes were translated from Chichewa to English and digitized for analysis. The qualitative data from the field notes were coded and organized by theme using a framework analysis as described by Ritchie and Lewis. (86)

To compare the levels of care between the adult and adolescent SCs, we report the proportion of disrespectful care stratified by case scenario. We used a simple logistic regression to quantify and test the differences in the two case scenarios - disrespectful care was the dependent variable, and case scenario was the independent variable. We reported the odds ratios and 95% CIs (Adult, method-switcher case scenario was the reference). We used the Kruskal-Wallis test to determine whether there were any differences by district and provider characteristics. (87)

Results

Simulated clients visited all 112 selected facilities, and completed data collection in 111 clinics (>99%) resulting in 222 SC consultations (111 adult and 111 adolescent consultations). Forms from

one clinic were inadvertently deleted before transfer to the server. The simulated clients reported there were no detectable suspicions from the providers or health staff.

Table 4 shows the background characteristics of the 111 providers with complete data. Half the providers were female and 40% were under the age of 30. Most were married (75.3%) and predominantly Protestant Christian (71.2%), followed by Catholic Christian (14.4%) and Muslim (11.7%). Sixty-four percent were nurses and 27.0% were community health providers known as Health Surveillance Assistants (HSAs), who also can provide services in facilities. Twenty-one percent of the providers had been at their position less than one year and most (71.1%) had a college certificate or diploma.

In 19% of the consultations, the simulated clients were not given, prescribed or referred for a family planning method. Some reasons for non-provision of any method were unrelated to disrespectful care and included stock-out of preferred method, or client refusal of procedures relevant for FP care (pregnancy tests, or other exams). Pills were the preferred method for both case scenarios. Appropriately, SCs were given/prescribed pills most commonly (60.4% of the consultations), and condoms (11.3%) and pills and condoms (8.6%) less commonly.

Table 2 shows the proportion of consultations with disrespectful by indicator for each domain. Appendix C shows illustrative quotes from the SC field notes by domain.

Refusal of care

Three reasons for service refusal were considered within this domain of disrespectful care: clinic was closed on reported days of operations, and the clinic mandated either HIV testing and counseling (HTC) and/or tetanus toxoid vaccination (TTV) in order to receive FP services. Almost 12 percent of the simulated client consultations did not receive their preferred method because

they did not consent to HTC (7.7%), TTV (1.8%), both HTC and TTV (0.5%) or the clinic was closed on days it was scheduled to be open (1.8%).

"FP provider told me to go for HTC before I can access FP services. FP provider said it is compulsory for me to do the test. If I refused then they will not assist me. So I told the FP provider that I was not ready for the test hence I'm going home. FP provider told me to go only come again when I'm ready for the test. So I exited that facility without any method." – Adolescent SC

Refusal of care differed by district. In one of the districts, 57.7% of simulated client consultations were refused service predominantly because the clinics mandated HTC. There was no difference in refusal of care between the two case scenarios (OR: 1.0, 95%CI: 0.4, 2.3) (table 5). In 14% of consultations HTC and/or TTV was encouraged but the SCs were still able to receive a FP method (Appendix C).

Non-private consultations

Over half of the consultations (53.9%) took place in a group setting (table 5). Among the 90 consultations that were done privately, 75.5% had both visual and auditory privacy. Overall 59.3% of the consultations took place in a group setting or individually but with no visual or auditory privacy. There was no difference in non-private care between the two case scenarios (OR: 1.4, 95%: 0.7, 2.5).

"All the counselling and how to use properly the condom was done on one of the verandas on the hospital visible for everyone to see." – Adolescent SC

Poor client-centered care

Here we explore the five constructs of poor client-centered care.

Incomplete information on FP options

In over half the consultations (55.9%), the provider did not mention any other methods beyond hormonal pills which the SCs requested (table 5). On average, the providers were more likely to not mention any other method beyond hormonal pills for the adult, method-switcher case scenario (69.4%) compared to the adolescent, first-time user case scenario (42.3%) (OR: 0.3, 95% CI: 0.2, 0.6).

Incomplete or inaccurate information

In 73.6% of the consultations, the SCs were given incomplete information about use, side effects, what to do if the client experienced side effects and whether the received/prescribed FP method (either pills and/or condoms) protected against HIV acquisition (table 5). The counseling component most often omitted was the lack of HIV protection of pills and the protective aspect of condoms (67.4%), followed by return to the clinic with persistence of side effects from the pills (57.5%), and listing of the side effects of pills (52.9%). Counseling on how to use pills and/or condoms was least likely to be omitted (28.1%). Overall the adolescent, first-time user SCs had lower odds of incomplete counseling (OR: 0.4, 95% CI: 0.2, 0.7) (higher odds of complete counseling) on the four components. The same pattern was seen for all four individual counseling components as well (table 5).

Through the quantitative tool, we documented whether any side effects were mentioned but not whether the side effects mentioned were correct or incorrect. However in the field notes, the SC recorded two events where they were counseled with inaccurate information on injectables and implants (Appendix C).

Client was unsupported in method choice

In over half of the consultations, the SCs were not asked their preference for FP method (56.8%) (table 5). The adult method-switchers were more likely not to be asked their preference (68.5%)

compared to the adolescent first time users. (45.1%) (OR: 0.4, 95% CI: 0.2, 0.7). Only in 5.4% of the consultations, did the SCs feel the provider was advocating for a specific method. This was more prevalent with the adolescent, first-time user SCs (7.2%) although not statistically different from what the adults SCs reported (3.2%) (OR: 2.1, 95% CI: 0.6, 7.1).

"We were not asked our preferred method but they assumed that we all came for injectable. I had to tell the provider that I wanted pills." – Adolescent SC

Poor listening and attention

In 27.5% of the consultations, SCs reported they were not greeted respectfully (table 5). The adult SC was more likely not to be greeted respectfully (30.6%) compared to the adolescent SC (24.3%) although not statistically different. In 19.8% of the consultations, the SCs reported interruptions during the consultation and there was no difference between the two case scenarios.

"During the discussion the nurse was on phone (Whatsapp)" – Adolescent SC (also reported by Adult SC at that clinic)

Non-dignified care

Two constructs were used to define non-dignified care. The first was humiliating treatment by the provider or the clinic staff including yelling, threatening, scolding or being insulted. The second was disempowerment of the client through the barriers of long wait times or additional, informal payments.

In 17.6% of the consultations, the SC recorded actions consistent with the definition of humiliating treatment (table 5). In 6.3% of the consultations the provider or staff person yelled at the client. Five percent of the providers expressed anger or yelled at the SCs when they did not consent to HTC, TTV or other mandated clinical procedures (examples in Appendix C). The adolescent SCs

reported humiliation with regards to their simulated age and access of FP services in 5.4% of the consultations.

"[Provider] counseled me to abstain not trusting my boyfriend in order to finish school properly. I was given pills and condoms for backup if my boyfriend insists to have sex before 7 days and the provider said that am young and should not be thinking of relationships." – Adolescent SC

The other reasons for humiliating treatment varied: being shouted at for standing in the wrong line, provider accusing the SCs of not paying attention, not believing the SC was not menstruating, or simply ignoring the SCs. In one case, the SC was sexually harassed by a FP health provider (Appendix C). Despite some of the adolescent SCs experiencing humiliation related to their simulated age, overall they experienced the same level of humiliation as the adult SCs (OR: 0.9, 95% CI: 0.5, 1.9). There was no difference in humiliating treatment by district, or provider gender, age or religion.

"Did not feel welcomed by the provider and people who were working at the hospital. I was told to leave my health passport book in the room where they conduct FP methods but when I entered the room, the person who was mopping the room started shouting at me" – Adolescent client (also reported by Adult SC at that clinic)

Nearly a third of the SCs reported waiting longer than one hour for services (28.8%) and there was no difference by case scenario (table 5). None of the SCs documented being asked for informal payments but the field notes recorded two events which may be related to informal payments (Appendix C).

Finally it is important to note the prevalence of respectful care reported by the SCs in Malawi. Many of the providers encouraged a client-centered environment, and went out of their way to be supportive and encouraging. In one instance reported by a SC, a provider detected a

discrepancy in the SCs presentation of the case scenario but still provided the SC with her preferred method (Appendix C).

Discussion

Our findings suggested that family planning clients in Malawi encounter considerable levels of disrespectful care that could affect uptake and use of family planning. In a small proportion of the consultations, the SC were refused services or experienced humiliation treatment, a clear example of disrespectful care. We also found evidence that Malawian women accessing family planning may experience lack of privacy, poor counseling quality and poor provider communication. In the following section, we review the conclusions of the study by domain.

Discussion by domain

In 10% of the consultations, the SC were refused services for not consenting to HTC and/or TTV. The Malawi sexual and reproductive health (SRH) policy directs integration of HTC into health care services and the national immunization program recommends TTV for all women of childbearing age but the polices do not mention these as conditional for accessing FP. (67,88) Using the framework as a guideline, we defined the refusal of FP care due to HTC/TTV noncompliance as disrespectful care - abandonment for not complying with medical procedures unrelated to FP. We could not find any documented instances where provision of care was dependent on client acceptance of medical procedures unrelated to FP. In Tanzania, some clinics were refusing care for antenatal patients because the women did not attend the clinic with their husband, an incorrect interpretation of a policy meant to encourage men to attend antenatal care.[1] It could be some providers incorrectly interpreted the policy around TTV and HTC as well. Because these instances were clustered in one district, it is likely the result of a district-wide phenomenon rather

[1] Personal communication, Ashley Sheffel, January 2019

than a national policy or problem. More work is needed to determine the policies, practices, interpretations or misunderstandings that could have led to refusal based on non-compliance with requested testing.

There was a general lack of privacy at registration, in the waiting area and during the consultation. Privacy is particularly important for adolescent clients.(89) Group counseling – by definition non-private – has been recommended for FP services in resource-constrained areas. (90) The current Malawi SRH guidelines state that counseling should be conducted privately however it may not be feasible to implement this policy in all settings.(91) Whether lack of privacy can be considered disrespectful care depends on the context and the ability of the health system, given resource constraints.

We found suboptimal quality of counseling in this study, similar to what has been measured previously in Malawi. (72) In over half of the consultations, the provider did not counsel the client on FP options and gave insufficient counseling for the method given/prescribed. We considered whether counseling was appropriate given the two case scenarios. The adult SC had previously used pills and was currently using injectables, the providers may have thought it unnecessary to counsel her although FP guidelines state the providers should provide complete counseling for "provider-changers" (client who sees a provider for the first time) and those who want to switch methods. (91) Even when we restrict the analysis to the adolescent SC – the first-time users - less than half were told any other FP methods and over half received incomplete counseling for the method recommended. The providers may not have offered the full menu of contraceptive options and instead just asked the SCs what they preferred, as was done in over half the consultations.

Finally, within the client-centered care domain, we found about a third of the time the SCs were not greeted respectfully, an important first step to establishing client-provider rapport. A study using simulated clients in Nigeria found similar results, 40% of the SCs were not respectfully greeting during FP consultations.(92) A similar study in Kenya found the SCs were not greeted respectfully in 18% of the FP consultations.(62)

Nearly a fifth of the simulated client interactions included humiliating treatment. In 6.3% of the consultations, the SC was yelled at by a provider and in 5.0% of the consultations the adolescent SCs experienced judgmental comments related to her age. These events could have serious impact on utilization of health services, especially among youth. Almost a third of the SCs waited longer than an hour for FP services. Long wait times are a barrier to health care access. (93)

Previous studies on disrespect and abuse measured through simulated client protocols show varying results. A simulated FP client study in Uganda found the providers raised their voice or shouted at the simulated client in 4% of the interactions. (53) A similar study in Senegal with adolescent SCs found that adolescents had difficulty accessing the providers and experienced unwelcoming attitudes once at the facility. (54) SCs from a study in Kenya reported instances of negative comments or rude behavior by FP providers. (62)

Limitations

This study has some important limitations. One is the artificial nature of the client simulation which may impact their reporting of respectful care. During the parent study, less than 4% of the actual (non-simulated) clients reported non-dignified care during the client exit interviews (unpublished). Non-dignified care experienced by the actual clients included long wait times, being ignored/shamed by the health staff, or the health staff not believing what the clients told them about their sexual activity and contraceptive use. SC training on how to report the details

of the consultation may have sensitized them to the idea of respectful care, and they may have reported more events that may have otherwise been seen as normalized care. SCs were trained to avoid clinical procedures such as HTC and TTV and refusal may have created conflict with the health staff. If most of actual clients agree to HTC and TTV, then that may be why the prevalence of humiliation was lower in the client exit interviews.

The SCs may have difficulty remembering the details of the consultation especially as the fieldwork progressed. We recognize the definition of "yelling" or "judgmental comments" is subjective and the SC perception of humiliating or shameful treatment may have shifted through the data collection as they encountered more providers. We did not consider it feasible due to logistical and financial reasons to audio record the SC consultation for later review but this is an option for other studies. The field notes were helpful to elucidate the events reported but having audio-recordings of the consultations would have been ideal to reduce subjectivity and improve accuracy in the assessment of disrespectful care. Additionally the field notes were an ad-hoc data collection method and the notes were of varying quality. Future studies measuring the prevalence of respectful care through simulated clients should include standardized field notes or other qualitative instruments. In order to adhere to ethical standards, the providers were informed that a masked SC would visit them to evaluate their practice. It is possible the providers detected the SC and provided them with higher quality of care than their normal practice.

Implications for respectful care and family planning

Within the respectful care framework, we identified two categories that would have different potential solutions. The first was poor quality of care that is likely due to insufficient training, human resources and other issues found commonly in resource-constrained settings. There were structural quality issues such as lack of privacy, long waiting times, and the clinic being

unexpectedly closed during normal hours of operation. Quality process measures such as poor counseling could be due to lack of training or time with the client. Although these issues stem from insufficient human resources and facilities, they may be framed as rights-based; clients deserve the dignity of private and efficient care.(94)

The second category is explicit disrespectful and non-dignified care. We considered the refusal of care due to TTV/HTC noncompliance and humiliating treatment in this category. When looking at these events, we considered provider and policy-level failures. The refusal of care seems to be a policy-level failure and the humiliating treatment was provider-level. Disrespectful care and abuse by providers is thought to stem from poor working conditions and disenfranchisement. (95) More work, particularly qualitative studies with providers in under-resourced settings, is needed to elucidate the root causes of disrespectful care and abuse, and how best to intervene to reduce it.

We also considered whether both these categories of events were directly linked to FP services or general access to health care. For example, the SCs may have been yelled at whether or not they were accessing FP. Long wait times and lack of privacy are found in other health program areas, but the humiliating treatment documented by some of the adolescent SCs and poor contraceptive counseling in general are specific to family planning. Respectful, person-centered care should be prioritized for all health delivery points but essential for family planning given the sensitive nature of contraceptive use and the importance of quality counseling.

Conclusion

This study quantifies and documents respectful care provided through public sector facilities, where 80% of modern contraceptive users in Malawi received their methods. (66) We found important instances of disrespectful care, most related to poor structural and process quality and

several instance of outright abuse. Some were linked to accessing family planning services and other were likely the result of general access of health facilities. Instances of disrespectful care have been reported in other settings and we consider this potentially a global issue, not specific to Malawi. Malawi has a strong SRH policy rooted in the ideals of respect and dignity for every person accessing health care. In order to implement this policy, governments and programs require regular quality assessments that include evaluation and reporting instances of disrespectful care and abuse.

Tables and figures for Paper 1

Table 4: Characteristics of providers with complete data for the simulated clients

Provider characteristics	**% (n=111)**
Provider gender	
Female	51.3%
Male	48.6%
Provider age	
20-29	40.5%
30-39	28.8%
40+	30.6%
Provider marital status	
Married (traditional, religious, or civil marriage)	75.3%
In a relationship, but not married	20.2%
Single	4.5%
Provider religion	
Catholic Christian	14.4%
Muslim	11.7%
Protestant Christian	71.2%
Other	2.7%
Provider title	
Medical assistant	9.0%
Registered Nurse or midwife	2.7%
Enrolled Nurse or midwife	41.4%
Community Nurse or midwife	19.8%
Health Surveillance Assistants (HSAs)	27.0%
Years at position	
0-1 years	21.6%
2-5 years	35.1%
6-10 years	11.7%
>10 years	31.5%
Provider education	
Primary or Secondary certificate	10.8%
Malawi School Certificate of Education	16.2%
College Certificate	28.8%
College Diploma	42.3%
Refused to answer	1.8%

Table 5: Proportion of consultations with disrespectful care total, by adult and adolescent simulated clients (SCs) and the odds ratio comparing the Adult and Adolescent SCs (reference=adult) by indicator for each construct.

Construct	Indicator	Total	Adult SC	Adol. SC	OR
		% (95% CI) n=222	% (95% CI) n=111	% (95% CI) n=111	OR (95% CI) n=222
Refusal of care					
Refusal of FP services due to non-essential procedures	% of consultations where the SCs did not receive method due to refusal of HIV test, TT vaccination or clinic was closed when it was supposed to be open	11.7 (8.1, 0.17)	11.7 (6.9, 19.2)	11.7 (6.9, 19.2)	1.0 (0.4, 2.3)
Non-private consultation					
Client services are not provided with visual or auditory privacy	% of consultations that took place in a group setting, or without visual and auditory privacy	59.3 (51.6, 66.5) N=167¥	55.6 (44.5, 66.1) N=81¥	62.8 (52.0, 72.4) N=86¥	1.4 (0.7, 2.5) N=167¥
Poor client-centered care					
Incomplete family planning options given by provider(s)	% of consultations where the provider did not mention any methods beyond what the SC requested (pills)	55.9 (49.2, 62.3)	69.4 (60.1 , 77.3)	42.3 (33.4, 51.8)	0.3 (0.2, 0.6)
Incomplete counseling given by provider(s)	% of consultations with incomplete counseling: Did not mention all 4 counseling components below for SC given/prescribed pills and/or condoms	73.6 (66.6, 79.6) n=178*	83.1 (73.8, 89.6) n=89*	64.0 (53.5, 73.4) n=89*	0.4 (0.2, 0.7) n=178*
	1. Not counseled on correct use for pills/condoms	28.1 (21.9, 35.2) n=178*	39.3 (29.6, 49.9) n=89*	16.9 (10.4, 26.2) n=89*	0.3 (0.2, 0.6) n=178*
	2. Not counseled on side effects for pills	52.9 (44.9, 60.8) n=153*	67.1 (55.7, 76.8) n=76*	39.0 (28.6, 50.4) n=77*	0.3 (0.2, 0.6) n=153*
	3. Not told to return to clinic if side effects persist for pills	57.5 (49.5, 65.2) n=153*	68.4 (57.0, 78.0) n=76*	46.8 (35.8, 58.0) n=77*	0.4 (0.2, 0.8) n=153*

	4. Not told whether method protects against HIV for pills/condoms	67.4 (60.1, 74.0) n=178*	76.4 (66.4, 84.2) n=89*	58.4 (47.8, 68.3) n=89*	0.4 (0.2, 0.8) n=178*
Inaccurate information by provider(s)	No quantitative data but mentioned in field notes				
Client unsupported in personal method choice	% of consultations where the provider advocated for a method during consultation	5.4 (3.1, 9.3)	3.6 (1.4, 9.3)	7.2 (3.6 , 13.8)	2.1 (0.6, 7.1)
	% of consultations where the provider did not ask client preference	56.8 (50.1, 63.2)	68.5 (59.2, 76.5)	45.1 (36.0, 54.5)	0.4 (0.2, 0.7)
Poor listening and attention by provider(s)	% of consultations where the provider did not greet SCs (or the group) respectfully	27.5 (22.0, 33.8)	30.6 (22.7, 39.9)	24.3 (17.2, 33.3)	0.7 (0.4, 1.3)
	% of consultations where the provider interrupted the SCs while speaking or interrupted consultation for other business	19.8 (15.1, 25.6)	21.6 (14.9, 30.3)	18.0 (11.9, 26.4)	0.8 (0.4, 1.5)
Non-dignified care					
Clients experience humiliating treatment from providers or other health staff	% of consultations where the provider SCs experienced humiliating treatment such as yelling, threatening, scolding, or being insulted	17.6 (13.1, 23.2)	18.0 (11.9, 26.4)	17.1 (11.1, 25.4)	0.9 (0.5, 1.9)
	Provider or other health staff raised voice/yelled at SCs	6.3 (3.8, 10.4)	8.1 (4.2, 14.9)	4.5 (1.9, 10.5)	0.5 (0.2, 1.7)
	Provider or other health staff made judgmental comments about SC young age and use of FP services	NA	0	5.4 (2.4, 11.6)	NA
	Provider or other health staff expressed anger with the SCs refusal to comply with clinic procedures	5.0 (2.8, 8.8)	5.4 (2.4, 11.6)	4.5 (1.9, 10.5)	0.8 (0.2, 2.8)
Clients are disempowered by the provider or staff	% of consultations where the SCs waited longer than one hour for services	28.8 (23.2, 35.2)	25.2 (18.0, 34.2)	32.4 (24.3, 41.7)	1.4 (0.8, 2.6)

	% of consultations where the provider asked for additional money (informal payments)	0	0	0	0

*Indicator includes on those who were given/prescribed pills and/or condoms; ¥Excludes those with no counseling

Chapter 5: Paper 2 – Validation study on clinical vignettes for measuring family planning quality practices

Background

There has been a renewed global awareness of the importance of quality health systems for family planning.(49) However, there is no standard set of tools or methods for measuring family planning quality of care in LMICs .(50) It can be measured through observation of patient-provider interactions, client exit interviews, simulated clients, provider knowledge tests, and review of medical records but there is little information on the validity of these methods (2). An ongoing systematic literature review found few validity studies on family planning quality of care measurement (unpublished). The review did identify a recent study that examined the validity of several methods using simulated clients as a gold standard but small sample sizes limited the conclusions.(1) Most of the methods such as provider observation or simulated client protocols involve field-based data collection which can be expensive and time-consuming.

Clinical vignettes (CV) have been used to measure health provider knowledge of quality care practices for decades.(55,96,97) With CVs, providers are given a standardized description of a fictional patient ("case scenario") and they report actions they would do during a consultation had the case scenario been an actual patient. Compared to questionnaires to measure provider knowledge, CVs may be a more accurate representation of care that would actually be provided. They allow for open-ended responses and ask the provider to respond not solely based on their knowledge of clinical/practice guidelines but when presented with a patient like they might encounter during their practice.(55)

One method for measuring quality of care practices – as opposed to knowledge - uses simulated or "mystery" clients. Simulated clients (SCs) are trained to adopt a case scenario and then present to a provider for care, without the provider knowing they are being evaluated. SCs can then document the questions the provider asked while taking client history, any physical exams conducted, elements of counseling, and methods recommended. Compared to having an assessor observe the provider during a consultation, simulated clients provide a more accurate measure of quality by reducing reactivity bias.

Clinical vignettes measure quality knowledge and simulated client protocols measures quality practices. However given that vignettes measure knowledge when presented with a client case scenario, they could be used as a proxy for quality of care practices rather than just knowledge. While experience in the United States indicates that CVs are an adequate proxy measure of physician practice using simulated clients as the gold standard, there is less information from LMICs particularly within family planning programs.(56,57) If vignettes are found to be a valid proxy, they would be a feasible option for LMICs to scale-up for routine quality monitoring.

As part of a larger quality of family planning care study in Malawi, we had an opportunity to test the validity CVs for measuring quality family planning practice using SCs as a gold standard. We decided to test a mobile phone-based clinical vignette tool instead of one administered in-person. Close to 99% of the population of Malawi have network coverage, ranked sixth for Africa. (98) Clinical vignettes administered by mobile phone – especially if they are a valid proxy of quality practice – would be a useful and inexpensive tool to monitor or evaluate family planning programs in Malawi and other LMICs. The aim of this study is to determine whether mobile phone-based clinical vignettes are a valid measurement of family planning quality care practices using simulated client consultations as the gold standard.

Methods

We conducted a sub-study within a larger quality of care study ("parent study") in Malawi of facility-based family planning providers working in six districts. The sampling frame for the parent study included both urban and rural public sector facilities. Private facilities, pharmacies and religious facilities that did not offer contraceptives were excluded. All public sector clinics that offered family services in the six districts were included in the study. Community-based health workers were excluded because they operate in relatively small communities and they would likely recognize the SCs as not being from their community.

Case scenarios

Based on training material used by JHPIEGO,(83–85) we developed two case scenarios, including one who was a married, adult client switching methods and a second who was an unmarried adolescent using contraceptives for the first time (Appendix B). Although these two case scenarios have other important distinctions besides their age, in this paper, we refer to them as the "Adult" and "Adolescent" case scenarios. The case scenarios were pretested in family planning clinics in non-study districts in Malawi and we collected information whether they were culturally and clinically appropriate. The same case scenarios adopted by the SCs were used in the CVs and each provider was evaluated using both scenarios (2 measurements per provider: 1 Adult and 1 Adolescent).

Simulated clients

Simulated clients were selected based their survey experience, and willingness and capacity for the position to play the adolescent or adult case scenario. The SCs were trained to provide the information from their assigned case scenario when asked by the provider in order to mimic an actual consultation and to avoid all clinical procedures including administration of contraceptives,

and exams or any other procedure that might cause them mental or physical discomfort. The training included practice, role-plays and a pilot in a non-study clinic. We developed a SC checklist to document provider activity during the consultation.

Data collection was carried out from January through March 2018. Both the Adult and Adolescent SCs arrived at a facility on the same morning, traveling separately. All SCs presented as clients accessing the particular study clinic for the first time. When the consultation was complete, the SCs walked back to the meeting point and were immediately interviewed by the study supervisor using the SC checklist. After the SC checklist was complete, the supervisor returned to the clinic to interview providers on their background characteristics, education and professional status.

Clinical Vignettes

We created the CV tool with the aim of mimicking an actual consultation. The interviewer began with a short description of the client and the provider was invited to ask questions in order to gain more information. If the provider asked a relevant question, the interviewer released additional information about the client. Once the provider said they had finished asking questions they were asked whether they would conduct any exams, which exams they would conduct and finally which family planning method they recommended for this client. The provider was allowed to recommend multiple methods they deemed appropriate and the responses were recorded in the CV tool.

The training for the mobile phone-based interviews took place in February 2018 over two days. The staff were trained on the CV tool, protocol and given opportunity to role play and practice with non-study clinical staff. The interviewers began mobile phone interviews after a minimum of three weeks had passed since the SC visited that particular provider. The interviewers attempted to call each provider at least 10 times. If poor network access was an issue,

interviewers were instructed to send a text message asking the provider to call when they had network service or relay messages through the providers' coworkers.

Analysis

The provider behaviors reported and tested for validity are in table 6 along with notes on the list development. We reported the prevalence and 95% confidence intervals (CIs), and the validation analysis for the adult and adolescent case scenarios individually and combined.

To conduct the validation analysis, we calculated the percent agreement between the SC and CV, the sensitivity (the proportion of providers who report an action during the CV among those who did the action during the SC), specificity (the proportion of providers who did not report an action during the CV, among all those who did not do it during the SC), and the Area under the Receiver Operating Characteristic curve (AUC). The AUC represents the probability that a particular test correctly rates one "positive" subject and one "negative" subject that are randomly chosen and therefore summarizes the validity of the test.(99,100) A score of 1.0 shows the CV response perfectly captures how the provider acted during the SC consultation. A 0.5 score shows the CV responses are not better than a random guess. Following convention, we only reported the validation analysis for an indicator with sufficient sample size, 5 or more sample in each cell of the 2x2 table.(99) We used a user-generated Stata program to calculate AUC.(101) We conducted bootstrap analysis to generate 95% CIs for AUC, sensitivity and specificity that take into account the clustered data (2 case scenarios per provider).(102)

Results

All providers at the public sector facilities offering family planning in the six districts agreed to participate in the study (n=112). Figure 3 shows the flow chart of completed data for the SC consultations, the CV phone interviews and the matched data. Beginning with the SC

consultations, the data forms at one clinic (2 SC consultations) were completed but accidently deleted and in 12.5% of the consultations, the SCs were refused services. In several cases, one of the SCs was allowed services at a clinic while the other was not. We had complete data for 88.4% of the SC consultations. Almost 10% of the provider sample was unreachable by mobile phone and 1 provider reported they did not have access to a mobile phone. We had completed CV data for 89.3% of the providers. After matching the SC and CV data by provider, 79.5% of the providers had matched data for at least one of the case scenarios and 75.9% of the total consultations were matched.

Table 7 shows the background characteristics of the 89 providers with matched data for at least one of the case scenarios. Half the providers were female and 40.5% were under the age of 30. Most were married (62.9%) and predominantly Protestant Christian (76.4%), followed by Catholic Christian (14.6%) and Muslim (9.0%). Majority were either registered, enrolled or community nurses/midwives (59.6%) and 30.3% were community health workers known as Health Surveillance Assistants (HSAs), who also can provide services in facilities. Twenty-one percent of the providers had been at their position less than one year. There was no significant difference in response rate by the provider characteristics listed in table 7.

Validation analysis

Table 8 shows the validation analysis results for the provider behaviors with sufficient sample size (at least 5 observations in each cell of the 2x2 table). AUC ranged from 0.6 (95% CI: 0.5, 0.7) for whether the provider asked the client her method preference to 0.4 (95% CI: 0.3, 0.5) for asking the client her age. The 95% CIs for the AUC overlapped 0.5 for all behaviors indicating the CV was no better than a random guess as to what the provider did during the SC consultation. The validation analysis stratified by adult and adolescent case scenario had the same results (Appendix

D1). During the CV, the providers reported they would provide differing levels of care than they actually practiced during the SC consultation. In the following sections, we present method(s) recommended, questions asked during client history, exams recommended, and counseling quality from SC and CV data collection methods for the overall sample and then stratified by adult and adolescent case scenarios.

Comparing CV and SC responses

Providers recommended pills statistically significantly more frequently during the SC consultations than in the CV (fig. 4). During the CV, the providers recommended condoms more often (54%, 95% CI: 46%, 61%) compared to the SC (22%, 95% CI: 15%, 31%) and prescribed more methods. Providers prescribed an average of 2.2 methods (95% CI: 2.1, 2.5) during the SC consultations compared to 3.7 methods (95% CI: 3.4, 4.1) during the CV.

Figure 5 shows the proportions of different questions asked for the client history in the SC consultations versus the CV. During the SC consultations, providers more frequently asked the client about her age, number of children, last delivery date, whether she is breastfeeding, the regularity of her menstrual cycle, and number of sexual partners and these differences were statistically significant. During the CV, more providers said they would ask about chronic illnesses, and the client's preferred method compared to the SC consultations and these differences were also statistically significant. Providers said they would conduct more exams during the CV compared to the SC consultations, including measuring blood pressure and weight, a physical exam for signs of anemia, and pregnancy test. (fig. 6). During the SC consultation, providers statistically significantly recommended testing for HIV more often.[2]

[2] These are providers who recommended HIV tests but care was not contingent. The providers who refused services because the SC did not agree to HIV test (or other clinical procedures) were excluded as previously mentioned.

We were able to measure quality counseling components on a subset of clients who received or were prescribed pills (n=137; adult case: n=69, adolescent case: n=68). Compared to what they told the client during the SC consultation, the providers reported statistically significantly greater levels of counseling during the CV including what to do if the pill was not taken on time (59%, 95% CI: 47%, 70% versus 26%, 95% CI: 19%, 34%) (fig. 7).

Stratified analysis by adult and adolescent case scenarios

For methods recommended, we found the same pattern in the stratified analysis as we did in the overall analysis (Appendix D2). In both the adult and adolescent case scenarios, the provider recommended the pills statistically significantly more during the SC consultation compared to the CV and the condoms were recommended more during the CV. However for questions asked during the client history, we found a different pattern when stratified by case scenario compared to the combined analysis (Appendix D3). For the adult case scenario only, providers statistically significantly, more frequently asked about age, last delivery, regularity of menstrual cycle, and currently breastfeeding during the SC consultation compared with what they reported during the CV.

For exams, the stratified analysis showed similar results to the overall analysis (Appendix D4). For both the adult and adolescent case scenarios, the providers stated they would conduct statistically significantly more exams during the CV than what was documented during the SC consultation, except for HIV testing. HIV testing was recommended more during the SC consultation than reported during the CV for the adolescent case scenario only.

Finally for counseling quality, the provider reported during the CV they would counsel the adult SCs more frequently on pills use and side effects compared to the SC consultation (Appendix D5).

There was no statistically significantly differences in counseling on use and side effects between SC and CV for the adolescent case scenario.

Discussion

This study on quality measurement of the national family planning program in Malawi shows that practice reported during a CV interview is not consistent with actual practice as measured during a SC consultation, even when comparing the same client case scenario. We aimed to test whether mobile phone-administered vignettes measuring knowledge could be a valid proxy of practice and found no evidence of this. During the CV, providers said they would conduct more exams, recommended more methods, and asked certain questions more often than what was measured during the SC consultations. They reported more counseling on what to do if the pill dose was forgotten or mistimed compared to how the SCs were counseled during the consultation. Conversely, providers asked certain questions more often during the SC consultation and recommend the preferred method more often compared to the CV.

Generally, our findings are in line with previous research in on validity of CVs in LMICs. In Tanzania, a study found that CVs did not correlate to the provider's practice as observed by an assessor for care of fever, cough, and diarrhea-related illnesses.(103) A study in India compared CV and SC for child health illnesses and found higher knowledge compared to practice. (104) Another study in Ethiopia compared CV and assessor observation as measured through a facility survey and also showed higher quality knowledge compared to the observation for childhood illnesses.(105) In the Ethiopia study, two of the quality indicators were higher for the assessor observation compared to the CV by 30+ percentage points. None of these studies replicated exactly the same case scenario for knowledge versus practice assessments and none measured family planning quality.

We considered the reasons for the discrepancy between the CV and the SC. The providers may have reported more behaviors during the CV because they knew it was an assessment but (ideally) did not know they were being assessed when the SCs visited for care. This is likely an example of the "know-do" gap – the difference between what the provider knows and what they practice – and it has been reported elsewhere.(106) High patient caseload, poor availability of supplies, and provider motivation are all factors thought to contribute to the know-do gap and this could certainly be the case in Malawi where the health system is overburdened and under-resourced.(72,107) The know-do gap may explain but some behaviors were reported more often in the CV for this study. Particularly the providers may have decided not to conduct exams during the SC consultation due to lack of supplies or time although stock-out or patient caseload data was not collected at the time of the study.

However, providers did some behaviors more often during the SC consultation than they later reported they would do during the CV. They asked certain questions more often when taking client history such as age, number of children, regularity of menstrual cycle and others (fig. 5). They were statistically significantly more likely to recommend the client's preferred method (pills) compared to the CV (fig. 4). Apparently something about the clinic environment or being presented with an actual client stimulated the providers to remember more procedures compared to the CV. We assessed whether the providers used job aids during the CV and most did not: 30.6% preferred not to use them and 63.5% said they did not have any job aids. It could be for some of these behaviors, the providers did not recognize it as a "quality" action and therefore did not report it during the CV, although it was done in practice. Either way, this is evidence that CVs may not be a reliable tool for even measuring knowledge in some settings.

The main strength of this study is that we were able to compare reported versus actual practice for the same provider given the same case scenario. Providers were only told they would be

visited by a masked SC and then interviewed later by mobile phone. They did not know the interview would be a CV nor that it was the same case scenario as the SC. The providers were not told which of the clients they saw were simulated and there was a minimum of three weeks between SC and CV.

Limitations

This study had several important limitations. One was possible measurement error due to SC reporting. They may have reported incorrectly when completing the SC checklist after each consultation. We did not consider it feasible due to logistical and financial reasons to audio-record the SC consultation for later review but this is an option for other studies. The providers may have detected the SC and altered their behaviors during the consultation. Another limitation of the study was the level of missing data (20%) due to non-response for the phone-based interview and/or SC being refused care at the clinics which may have impacted the validity findings. We could have used an in-person CV for the validation but we wanted to focus on the mobile phone-based tool since that method would be most feasible and inexpensive for Malawi to scale up for routine quality monitoring. Additionally the expense of deploying another team to the field for the in-person CV was not logistically manageable. Finally although we pretested the CV tool both in-person and by mobile phone, it is possible the tool had poor construct validity for measuring knowledge.

Conclusion

In conclusion, we found that CVs are not a valid proxy measurement of provision of quality family planning care for public sector facilities in Malawi. There is evidence that CVs conducted via mobile phone may not accurately capture knowledge of family planning procedures, since the providers tended to do some behaviors during the consultation that were not reported. This study

provides important information on the validity of quality of family planning care measurements where there is currently little information. More work is needed on determining the least biased but most feasible method for measuring quality knowledge and practice for family planning.

Tables and Figures

Table 6: Provider behaviors measured during the simulated client consultation and the clinic vignette

Given/prescribed FP method(s):

- Pills (may include other methods)
- Condoms(may include other methods)
- No methods given or prescribed by provider

Questions asked during client history by provider:

- Client's age
- Number of children client has
- Timing of last delivery or age of youngest child
- Client's STI status
- Whether client has chronic illnesses
- Whether the client is currently breastfeeding
- Timing of last menstrual period
- Regularity of menstrual cycle
- Whether client has a husband or boyfriend (partner status)
- Number of sexual partners
- Client's partner(s) attitude towards family planning
- Whether client wants any or more children in the future
- Client's preference of contraceptive methods

Exams

- Any exams
- Blood pressure measured
- Weight measured
- Exam for signs of anemia (check eyes or nails)
- Pregnancy test
- Breast exam
- Abdominal exam
- Vaginal/cervical exam
- HIV/STI test

Components of counseling: pills

- Told the client when to take the pill
- Told the client what to do if pill is not taken in time or forgotten
- Warn the client of side effects that may occur
- Told the client Should return to clinic if side effects continue
- Mentioned that method does not protect against sexually transmitted infections.

Notes on list development:

We conducted a review of family planning quality of care indicators[3] and included those that could be measured by both SC and CV.(39,72,108,109) The methods prescribed, the questions asked when collecting client history and exams recommended were collected for each of the two case scenarios. The components of counseling were asked at the end of the CV tool and not linked to a case scenario. During the pretest, we found no differences in provider responses to the counseling quality questions by case scenario and it increased the interview to an unacceptable length to the providers. The counseling quality information reported during the vignettes was compared to what the provider told the simulated clients during the consultation.

[3] Personal communication, Amani Siyam, World Health Organization Quality of Care indicators, Draft. April 2017

Figure 3: Sample and response rates for the simulated client (SC) consultation and the clinical vignette (CV) interview.

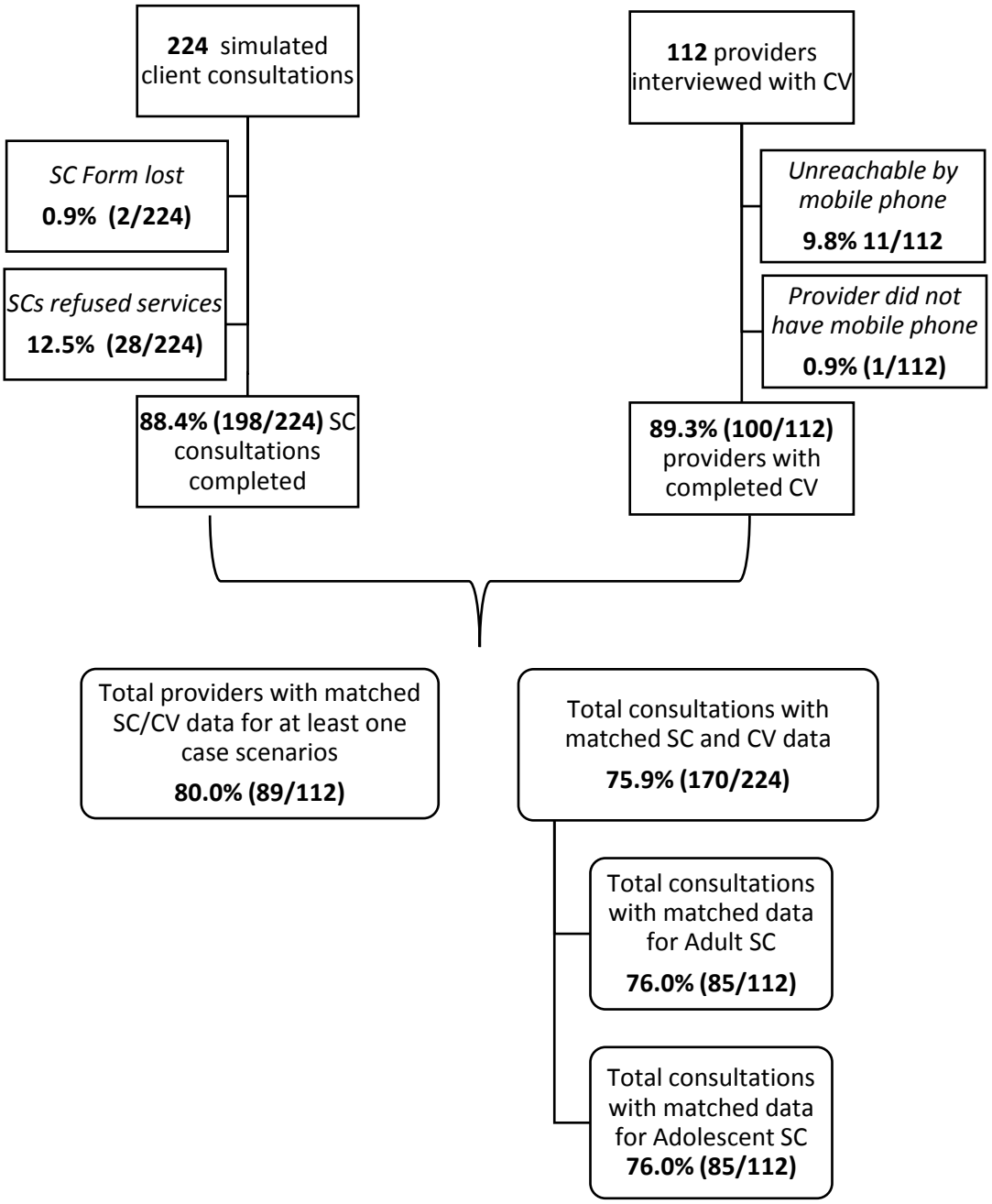


Table 7: Characteristics of providers with complete data from the simulated client consultation and clinical vignette interview

Provider characteristics	**% (n=89)**
Provider gender	
Female	49.4
Male	50.6
Provider age	
20-29	40.5
30-39	28.1
40+	32.0
Provider marital status	
Married (traditional, religious, or civil marriage)	62.9
In a relationship, but not married	15.7
Separated/divorced or Widowed	4.5
Single	16.9
Provider religion	
Catholic Christian	14.6
Muslim	9.0
Protestant Christian	76.4
Provider title	
Medical assistant	10.1
Registered Nurse or midwife	3.4
Enrolled Nurse or midwife	34.8
Community Nurse or midwife	21.4
Health Surveillance Assistants (HSAs)	30.3
Years at position	
0-1 years	21.4
2-5 years	32.6
6-10 years	12.4
>10 years	33.7
Provider education	
Primary or Secondary certificate	12.4
Malawi School Certificate of Education	18.0
College Certificate	32.6
College Diploma	37.1

Figure 4: Family planning method(s) recommended during the simulated client consultation and the clinical vignette interview, both case scenarios combined (n=170)

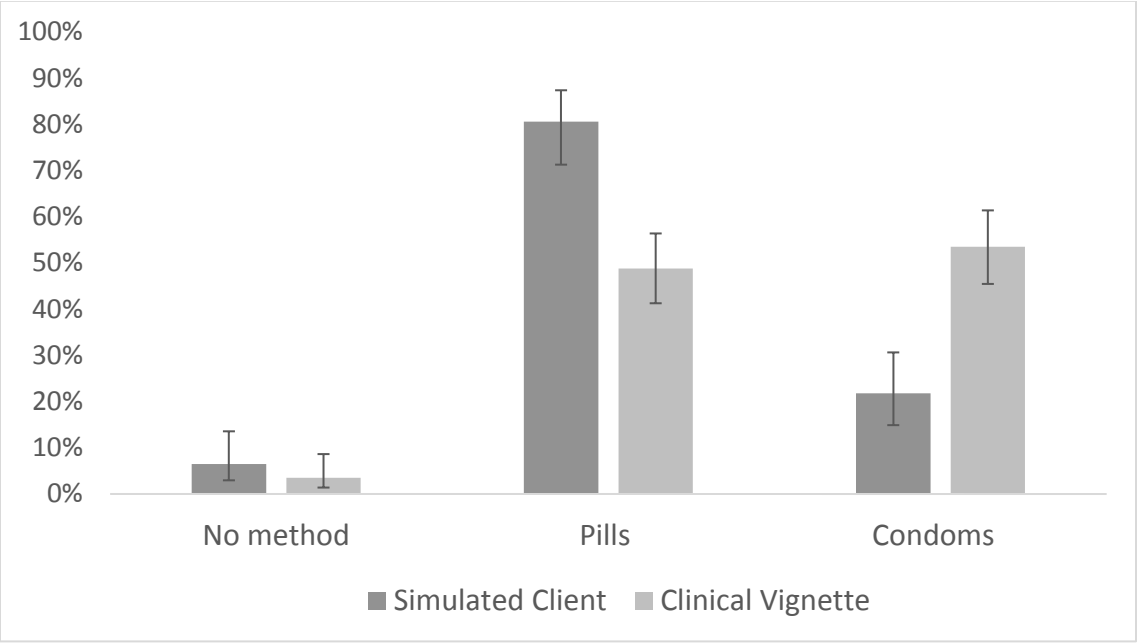


Figure 5: Questions asked when taking client history during the simulated client consultation and the clinical vignette interview, both case scenarios combined (n=170)

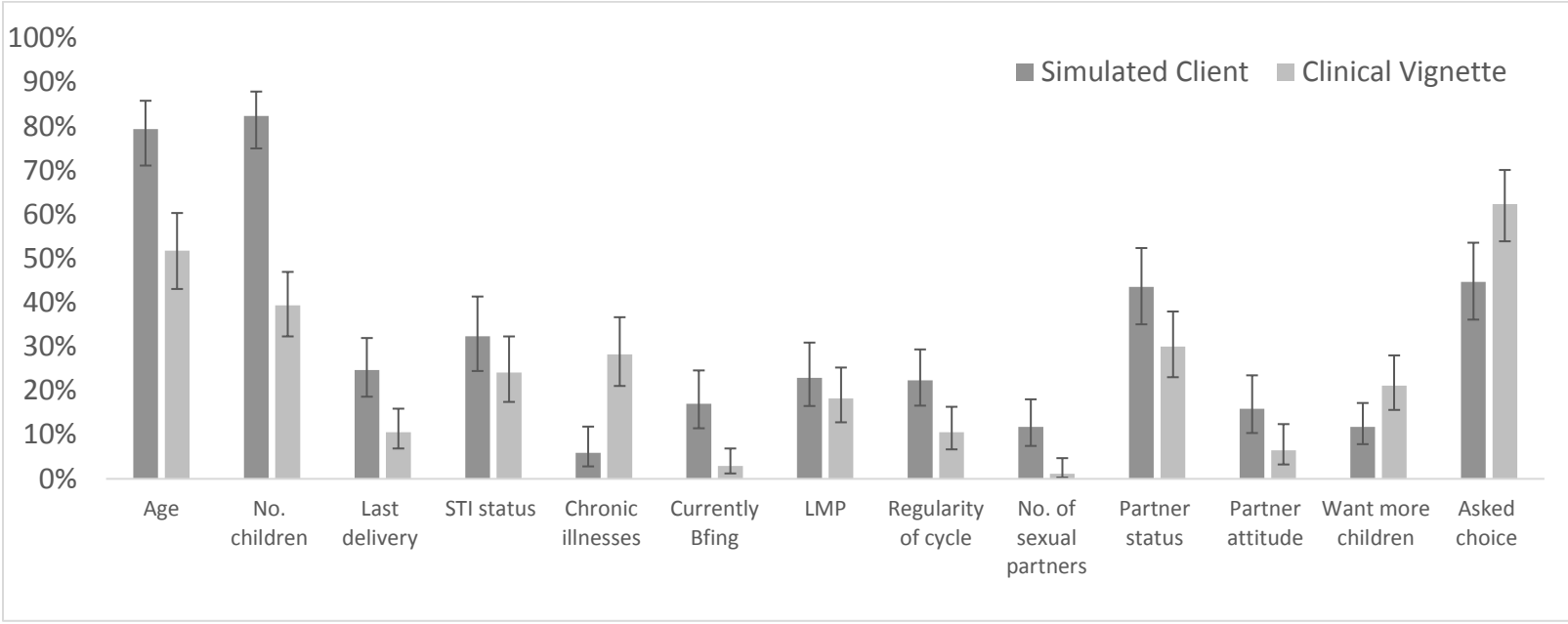


Figure 6: Exams recommended during the simulated client consultation and the clinical vignette interview, both case scenarios combined (n=170)

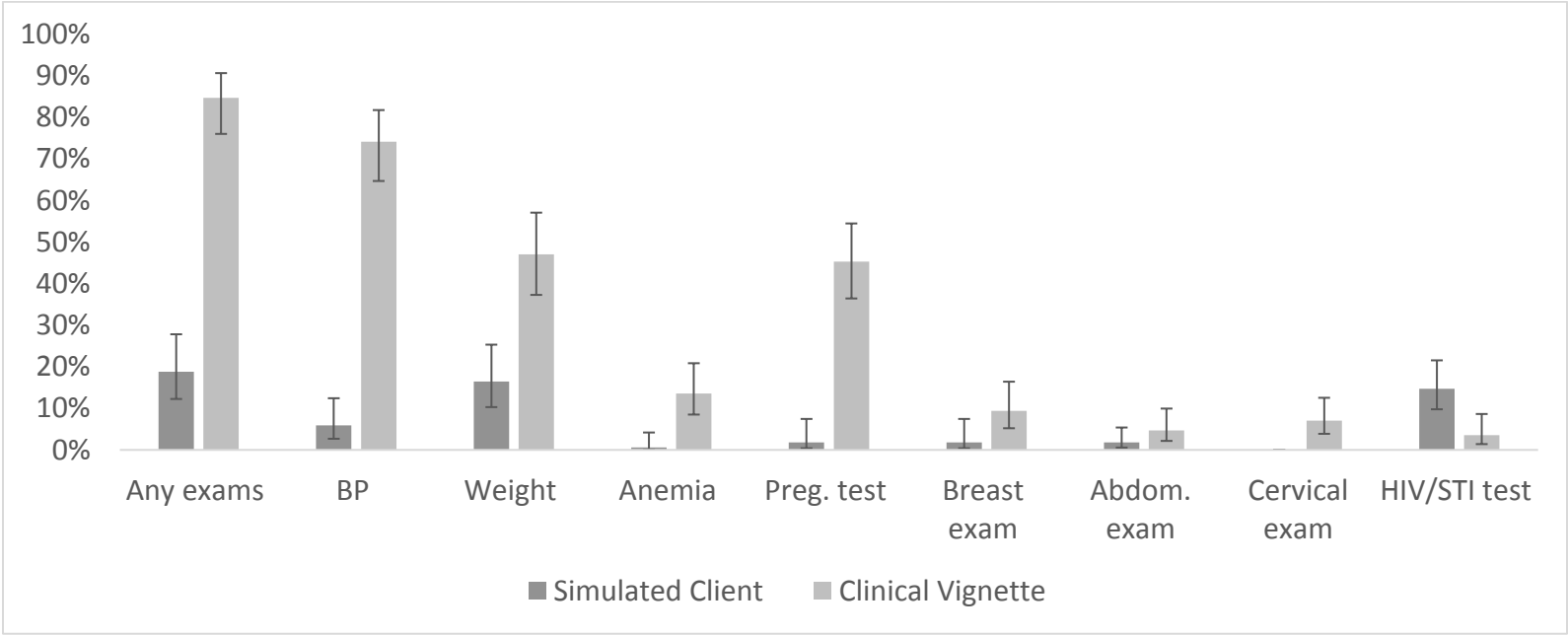


Figure 7: Quality counseling components during the simulated client (SC) consultation and the clinical vignette interview for SC who were given/prescribed pills, both case scenarios combined (n=137)

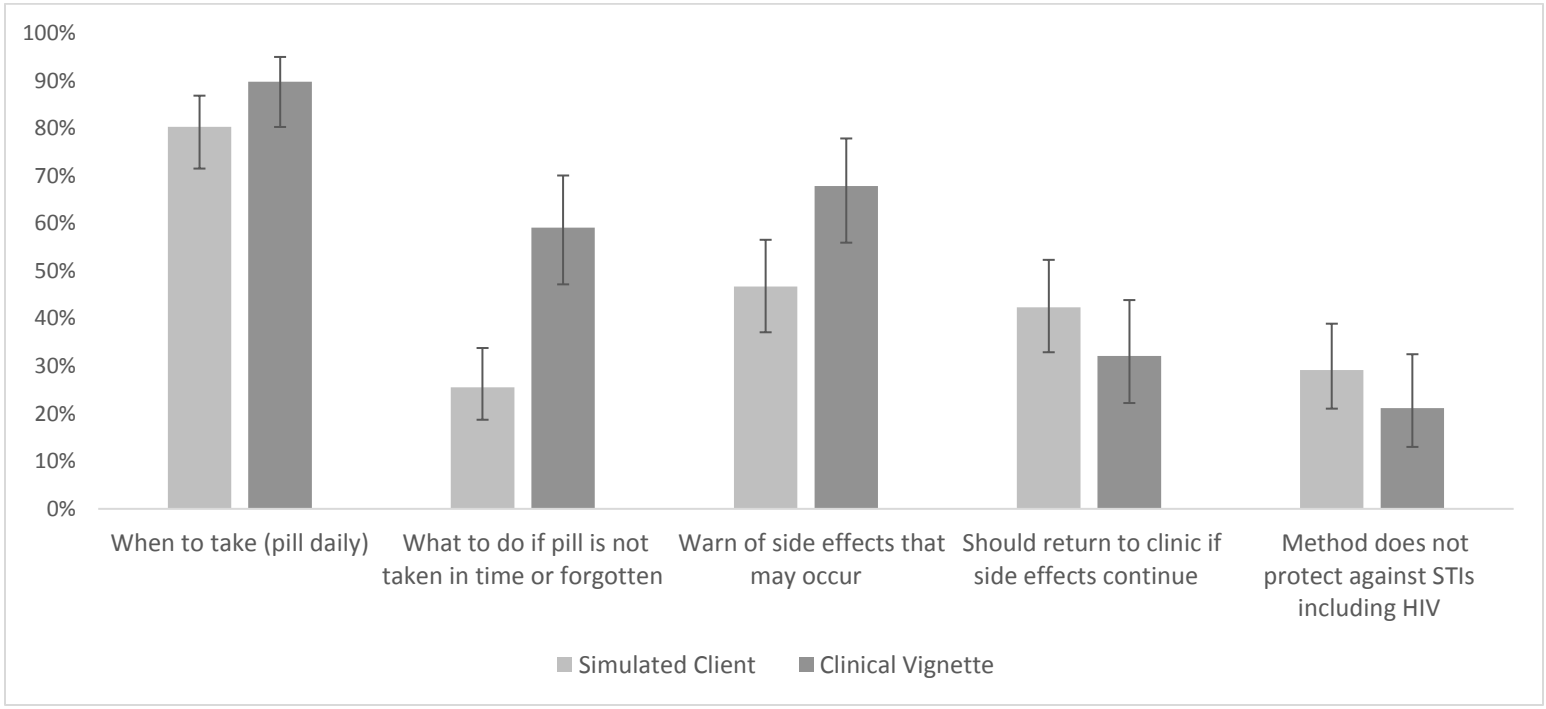


Table 8: Validation analysis comparing the simulated client consultation and the clinical vignette interview for provider behaviors with sufficient sample size only*, both case scenarios combined

	% Agreement	Sensitivity (95% CI)	Specificity (95% CI)	Area under ROC¥ curve (95% CI)
Method recommended (n=170)				
Pills	47.1%	47.5 (39.5, 55.4)	45.5 (26.0, 64.9)	0.5 (0.4, 0.6)
Condoms	43.5%	43.2 (27.1, 59.3)	43.6 (35.0, 52.2)	0.4 (0.4, 0.5)
Questions asked during consultation (n=170)				
Age	44.1%	47.4 (37.8, 57.0)	31.4 (14.2, 48.6)	0.4 (0.3, 0.5)
Number of children	41.8%	38.6 (30.6, 46.5)	56.7 (40.3, 73.1)	0.5 (0.4, 0.6)
STI status	62.4%	29.1 (17.2, 41.0)	78.3 (69.6, 86.9)	0.5 (0.5, 0.6)
Last menstrual period	67.1%	18.0 (5.2, 30.7)	81.7 (74.3, 89.0)	0.5 (0.4, 0.6)
Partner status	55.9%	33.8 (23.5, 44.0)	72.9 (63.9, 82.0)	0.5 (0.5, 0.6)
Asked method preference	56.5%	71.1 (60.3, 81.8)	44.7 (33.1, 56.3)	0.6 (0.5, 0.7)
Exams (n=170)				
Weight	50.3%	53.6 (31.5, 75.6)	49.6 (43.0, 65.4)	0.5 (0.4, 0.7)
Counseling quality components (n=137)				
What to do if pill is not taken in time/ forgotten	47.5%	62.9 (45.1, 80.6)	42.2 (29.8, 54.5)	0.5 (0.4, 0.6)
Warn of side effects that may occur	52.6%	71.9 (57.7, 86.1)	35.6 (21.5, 49.7)	0.5 (0.5, 0.6)
Should return to clinic if side effects continue	54.7%	34.5 (20.0, 49.0)	69.6 (57.0, 82.2)	0.5 (0.4, 0.6)
Method does not protect against sexually transmitted infections	65.7%	27.5 (11.4, 43.6)	81.4 (70.6, 92.3)	0.5 (0.5, 0.6)

*5 or more sample size in all cells of the 2x2 table; ¥ Receiver Operating Characteristic

Chapter 6: Paper 3 - Reliability of mobile phone-based clinical vignettes for measuring family planning quality knowledge

Background

Contraceptive use has increased dramatically in the last 50 years resulting in smaller families, however the unmet need for family planning in unacceptably high. (14) Responding to continued poor or stagnating health outcomes and inequities, there has been increased global recognition and focus on improving the quality of health services as reflected in the Sustainable Development Goals and the principles of Universal Health Care (2,110). In order to ensure effective health systems, governments in LMICs need efficient, timely, and accurate measures of quality of care to monitor, evaluate and improve health services.

As defined by the Donabedian framework, one component of quality of care is health provider "technical performance" or the adherence to quality practices during client consultations. (30) Knowledge of these practices is a prerequisite for quality provision but it does not guarantee it. (30) Program implementers require accurate tools to measure provider knowledge in order to effectively monitor and improve health system quality. Knowledge of quality practices may be assessed through clinical vignettes (CVs). (55,56) Clinical vignettes are ideal for measuring knowledge across providers since they account for differences in patient mix and reduce the effect drug or supply stockouts. (56) However in-person assessments of quality knowledge are expensive and time-consuming and LMICs require more timely but accurate data for program improvement. Mobile phone network and use has increased world-wide, opening the field of digital health. Mobile phone-based administration of CVs would be a feasible method for LMICs to scale-up for routine monitoring if they reliably measured knowledge compared to in-person CVs.

As part the larger quality of family planning care study in Malawi, we had an opportunity to test the reliability of mobile phone versus in-person CVs for measuring knowledge of quality family planning practices. In 2016, almost all of Malawi had mobile phone network coverage, ranked sixth for Africa, an ideal location for testing the reliability of mobile phone CVs for LMICs. (98)

In Malawi, family planning care is provided by facility-based providers, and two cadre of community-based providers: Health Surveillance Assistants (HSAs) and Community-based Distribution Agents (CBDAs). HSAs offer condoms, contraceptive pills, and injectables and CBDAs provide condoms and pills.(111) HSAs are salaried government health providers with a minimum of grade 10 education and a 10 week basic training course (not including any specialization training).(112) CBDAs are community-based volunteers. Given the differing level of training, education and experience, it is important for the government of Malawi to routinely monitor quality knowledge. Many HSAs and CBDAs are stationed in remote, difficult to access communities and mobile phone-based quality knowledge assessments would allow more frequent monitoring.

This study will test the reliability of mobile phone-based CVs for measuring knowledge of quality family planning care compared to in-person administration of CVs for facility and community-based health providers in Malawi.

Methods

This is a sub study of a larger quality of care study of public sector facilities in six districts of Malawi. The study participants were facility-based providers, HSAs and CBDAs who provided family planning services and the entire parent study sample was used for this study.

Case scenarios and CV tool

We developed three family planning client case scenarios. One was a married, adult client with an uncomplicated medical history, the second was a married, adult client with chronic illness and medical contraindications ("complex medical history"), and the third was an unmarried adolescent with no previous use of contraception. The details of the case scenarios are available in Appendix E and were adapted from training case scenarios developed by JHPIEGO.(83–85) We pre-tested the case scenarios in family planning clinics in non-study districts in Malawi.

We created the CV interview tool with the aim of mimicking an actual consultation. The interviewer began by reading short description of the client and the provider was invited to ask questions in order to gain more information as would occur during a client history. If the provider asked a relevant question, the interviewer read out loud additional information about the client. Once the client history section was completed, providers were asked whether they would conduct any exams, which exams they would conduct and finally which contraceptive methods they recommended for this client. The provider was allowed to recommend multiple methods they deemed appropriate and the responses were recorded in the CV tool. The in-person CV included questions on provider demographics, professional information and their mobile phone number. The CV tool was pre-coded and translated into Chichewa, the predominant language in Malawi.

Since the three cadres offer different levels of care, we triaged the tool to be specific to each cadre. Only facility-based providers and HSAs were asked whether they would conduct a physical exam for each case scenario since CBDAs do not typically perform exams. CBDAs were only interviewed on counseling quality for condoms and pills and HSAs were only interviewed for condoms, pills and injectables. Facility-based providers were interviewed on counseling quality for condoms, pills, injectables, implants, IUDs and sterilization. We report on counseling quality for the common hormonal family planning methods in Malawi: pills, injectables, implants and IUD. HSAs and CBDAs could recommend (by referral) methods they do not provide such as sterilization

or implants. We only reported only on the methods most commonly (>10%) recommended by the providers.

Training and data collection

Two separate teams were trained and deployed: one for field based data collection of the in-person CV and another for the mobile phone-based CV data collection. Both teams were trained on the CV tool, study protocols, and participated in a pilot with non-study clinical staff. The mobile phone-based CV was conducted with each provider after a minimum of three weeks had passed since the in-person interview. The in-person CV data collection took place from January to March 2018 and the mobile phone interviews began in February and were completed in May 2018. The in-person CVs took place at either the clinic or the provider's home. For the mobile phone-based CV, the interviewers attempted to call each provider at least 10 times. If the provider did not personally own a mobile phone, interviewers attempted to reach him/her and conduct the interview using the mobile phone of another provider at the facility. If the provider could not be reached due to network outages, interviewers were instructed to text the provider asking them to call once they had network service. The interviewers could also ask the providers' coworkers to send a message to call the team. Each provider was interviewed twice: once in-person and once by mobile phone using the three case scenarios each time.

Analysis

Table 9 shows the provider behaviors that were reported and tested for reliability along with notes on the list development. For each behavior, we reported the frequency and 95% confidence intervals (CIs) for the in-person and mobile phone-based CVs pooled (3 case scenarios per provider) and for each case scenario separately. The 95% CIs for the pooled analysis take into account the data clustering by provider.

To test the reliability, we report the positive and negative percent agreement, the Cohen's Kappa statistic with 95% CIs and the Prevalence-Adjusted, Bias-adjusted kappa (PABAK) statistic with 95% CIs. The two kappa statistics measure the "inter-modal" reliability or two different modes of the same test between the in person CV and the mobile phone based CV. A Cohen's Kappa statistic and/or PABAK statistic of 0.6 or higher was considered reliable. We used the user-generated *kappaetc* to calculate both kappa statistics and 95% CIs in Stata. (113) We analyzed the reliability for each of the three case scenarios presented in the CV separately and pooled by provider taking into account the data clustering. Finally, we also conducted reliability analysis stratified by cadre: facility-based provider, HSA and CBDA.

Analysis of non-response

We anticipated provider non-response to the mobile phone based CV, especially since the HSAs and CBDAs work in remote areas with poor network coverage. We reported the non-response for the in-person and mobile phone-based CVs interviews separately, and for those with matched CV data (both in-person and mobile phone-based). We used logistic regression to identify and report provider-level factors associated with non-response. Since we had knowledge information from the in-person CV, we were able to test whether those who did not complete the mobile phone-based CV had different knowledge that those who did complete it.

We conducted a data imputation exercise to determine whether any missing mobile phone-based CVs would qualitatively change the kappa statistics. We analyzed two extreme situations: (1) assuming those missing mobile phone-based CV data would have responded exactly the same as their in-person CV and (2) assuming they would report the exact opposite. We also ran multiple imputations using cadre and in-person CV responses as the independent variables and extracted

one of the imputations. We then reran the Cohen's Kappa for the counseling quality indicators and one of the case scenarios.

Results

Table 10 shows number of providers selected, those with complete data for in-person and mobile phone-based CV, and those with data for both CV interviews. Of those selected, 96.1% of the providers completed the in-person CV and 88.2% completed the mobile phone-based CV. Eighty-four percent of the providers had complete data for both, ranging by cadre from 78.4% for facility-based providers to 92.7% for HSAs (table 10).The main analysis was conducted on those 479 providers with completed in-person and mobile phone-based CV data, pooled. We pooled the three case scenarios by provider for a total 1437 observations.

The predominant reasons for non-response were poor network connection, lack of access to a mobile phone, or provider did not answer the phone. Among those with complete mobile phone-based CVs, 48.9% were completed in one or two calls, 75.4% were completed in five calls or less, 14.2% required 10 or more calls.

Our study included more males (54.3%) compared to females (45.7%) and highest proportion (41.8%) were between 30 and 39 years of age (Table 11). Most were married (78.5%) and most were Protestant Christian (62.6%), followed by Catholic Christian (19.0%) and Muslim (18.0%). Of the facility-based providers most were enrolled nurses/midwives. Over a third (34.9%) of the sample have a college certificate or diploma and most had been at their position less than five years (39%).

We analyzed the pattern of non-response to the mobile phone-based CV by the provider characteristics in table 11. Non-response was different by cadre: both facility providers (OR: 2.9, 95% CI: 1.4, 5.9) and CDBAs (OR: 2.5, 95% CI: 1.2, 5.2) had a statistically significant higher odds of

non-responses compared to HSAs. Having a college-level diploma or degree was associated higher odds of higher non-response, but cadre and education level are highly correlated. We found one difference in quality counseling knowledge. Providers who did not respond to the mobile phone-based CV had a statistically significantly lower odds of reporting correct counseling for pill use during the in-person CV, adjusted by cadre (OR: 0.4, 95% CI: 0.2, 0.9). None of the three imputation techniques qualitatively altered kappa statistics or impacted the study findings.

In general, there is little evidence of the reliability of in-person and mobile phone-based CVs (tables 12 & 13). Mobile phone-based CV a reliable estimate of in-person CV for only one quality-based indicator– counseling that the implants are effective for five years (Cohen's kappa: 1.0, 95% CI: 0.9, 1.0 and PABAK: 1.0, 95% CI 0.9, 1.0) (table 12). The Cohen's kappa and PABAK gave different results for some of the reliability tests. The PABAK was 0.6 or higher (moderate or higher agreement) and the Cohen's kappa of less than 0.6 (little to no agreement) for whether the provider would conduct any exams, recommendation of sterilization as a method and several client history questions. Most of these reported behaviors were either all very high (>90%) or low (<10%) frequency behaviors and all had high (>85%) positive or negative percent agreement between the in-person and mobile phone-based CV.

The reliability analysis for each of the three case scenarios (unpooled) shows little evidence of agreement (Appendix F). Similar to pooled analysis, several provider behaviors such as questions asked during the client history and methods recommended have a PABAK of moderate agreement or higher, but a Cohen's kappa statistic of <0.6. They differed by case scenario and all had a positive or negative percent agreement of 85% or greater. The stratified analysis by cadre showed no evidence of reliability (data not shown).

Overall the providers reported more assessment and counseling behaviors during the mobile phone-based CV compared to the in-person CV. The providers reported statistically significantly more counseling components including counseling on side effects for pills, implants and IUDs, and what to do if the client misses a dose of injectables during the mobile phone-based CV (fig. 8). Providers recommended more methods during the mobile phone-based CV (fig. 9). For the unmarried, adolescent scenario, the providers recommended condoms statistically significantly more often during the mobile phone-based CV (73.3%, 95% CI: 69.1%, 77.1%) compared to the in-person CV (57.2%, 95% CI: 52.7%, 62.6%). For the married, adult with complex medical history case scenario, the providers recommended IUD more frequently during the mobile phone-based CV (38.4%, 95% CI: 34.1, 42.9%) compared to the in-person CV (29.0%, 95% CI: 25.1%, 33.3%). The data are unpooled because the case scenarios were written to elicit different FP methods.

During the mobile phone-based CVs, providers reported statistically significantly more client assessments including asking about the client's contraceptive history, preferred method, history of chronic illness, client age, whether she has a partner, desire for future children and reported measuring weight more often (fig. 10). We found similar results when we compared the in-person and mobile phone-based CV by each of the case scenarios although there was some variation in which indicators were higher by case scenario. (Appendix G).

For instance, during the mobile phone-based CV for the married adult uncomplicated medical history case scenario only, providers reported with statistically significantly more frequency that they would measure blood pressure (67.2%, 95% CI: 62.9%, 72.0%) compared to the in-person CV (52.7%, 95% CI: 47.3%, 58.1%) and administer a pregnancy test (41.6%, 95% CI: 36.4%, 47.0%) compared to the in-person CV (25.6%, 95% CI: 21.2%, 30.6%) (Appendix G1). These differences may be due to the differences in the details of the case scenarios but in general the providers

reported more asking more questions and conducting more exams during the mobile phone-based CV compared to the in-person CV.

Discussion

This study found that mobile phone-based CVs are not reliable for measuring reported family planning consultation behaviors compared to in-person CVs even when the same tool is administered with the same provider varying only the time and mode of administration. We believe this is the first study to look at inter-modal (comparing two modes of administration for the same test) reliability comparing mobile phone-based and in-person CVs for measuring family planning knowledge. Previous studies show inter-rater and intra-rater reliability of CVs administered in-person to be moderate or high. Studies from Ghana, Haiti and Afghanistan shows fair inter-rater agreement and very high intra-rater reliability among emergency triage score from CVs.(114,115) A study in Europe shows high inter-rater reliability for scoring hospital-related infections using CVs. (116)

The poor reliability found in this study was due to a higher frequency of reported behaviors associated with quality family planning knowledge during the mobile phone-based CV. The mobile phone-based CV was always administered second. The providers were not told that the second phone interview would be another application of the same CV tool nor did we give them any feedback on their performance during the in-person CV. There was a three week gap between the two CVs. Despite this, the second application of the CV shows almost universal increase in reported behaviors associated with quality family planning knowledge.

We considered whether a training could have occurred between the in-person and mobile phone based CV that would have improved provider knowledge. Clinics may have initiated small-scale refresher trainings after the study team visited, but we found the same increase in knowledge

across all districts indicating most or all of the clinics would have had to plan this. We consider it unlikely that a formal training was responsible for the increase in provider knowledge during the mobile-phone based CV compared to the in-person CV.

Instead, this study may have unintentionally replicated the conditions for "retrieval practice", recalling previously learned information.(117) Retrieval practice by testing and other applications was previously thought to only measure learning but it also is a powerful device to produce learning and improve long-term retention.(118) The subjects do not require feedback or scores on whether their responses are correct to have a measured increase in learning nor do they need to study between the tests. (117) We hypothesize that repeated applications of CVs stimulated the providers to remember and report more behaviors associated with quality care, particularly for counseling on side effects and conducting more comprehensive client assessments. To the best of our knowledge there is no published evidence that CVs are widely used to reinforce quality knowledge for health providers in LMICs. More work is needed on whether repeated application of CVs could be used to improve quality knowledge for family planning providers.

The lack of reliability for quality counseling and client assessments may be due to retrieval practice, but the lack of reliability for contraceptive methods recommendations is less straightforward. Providers are not recommending the same methods when presented with the same case scenarios. There is some evidence retrieval practice impacted their contraceptive recommendations for the second CV. They recommended condoms more often to the adolescent case scenario and IUD for one of the adult cases. Long-acting, reversible methods such as IUDs are being expanded in Malawi and the first CV may have stimulated providers to remember these as a recommended option.(111) However, even pills – the preferred method for all the case scenarios were not reliably mentioned by the providers for both the in-person and mobile phone-based CV.

We found many indicators that met our reliability threshold according to the PABAK but not for Cohen's Kappa. PABAK calculates agreement adjusting for the prevalence and bias of the indicator and tends to be higher than the Cohen's Kappa for low or high prevalence indicators. (119) In this study, we also found it to be greater than the Cohen's Kappa for very high or low prevalence indicators and one might conclude the mobile phone-based CV may be reliable for measuring such indicators. For instance, program implementers may be able to use mobile phone-based CVs to monitor whether a previously-measured quality knowledge indicators with prevalence over 90% remains high over time. Or this method could be used to accurately identify serious gaps in quality knowledge (with prevalence less than 10%). However there is no evidence that mobile phone CVs reliability measure quality indicators between 10-90% prevalence and therefore the method has limited usefulness for monitoring and evaluation purposes.

Limitations

The main limitation of this study is that the mobile phone-based CV was always administered second. Given there was greater frequency of reported quality behaviors during the second application, this biases the reliability study. There are other important limitations to mention. A separate group of data collectors conducted the in-person versus the mobile phone-based CV. It is possible their interviewing technique may have elicited different responses. However the training and supervision was done by the same staff as the in-person CV and therefore we expect minimal measurement bias from having separate teams administering the two CVs. Another limitation of the study was some non-response to the mobile phone-based interview which may have impacted the reliability findings. We conducted a data imputation exercise and none of the imputation techniques qualitatively altered kappa statistics, so we think that non-response did not substantively skew the study findings.

Conclusion

In conclusion, this study found low reliability of mobile phone-based CVs compared to in-person CVs. It was greater for high and low prevalence of reported behaviors but that has limited practical applications. Important biases limit the main conclusions on reliability given that reported behaviors associated with quality family planning care were higher at the second application of the CV. Simply asking the providers to talk through their client assessments and counseling strategies stimulated them to remember more procedures after the initial CV was complete. Future reliability studies testing quality knowledge should randomly allocate which test will be administered first to reduce this retrieval practice bias.

Tables and figures

Table 9: Reported provider behaviors measured during the in-person and mobile phone based clinical vignettes

FP method(s) recommended

- Pills (may include other methods)
- Condoms (may include other methods)
- Injectables (may include other methods)
- Implants (may include other methods)
- Intrauterine device (may include other methods)
- No method recommended

Conduct exams

- Any exams
- Blood pressure
- Weight
- Check for anemia
- Pregnancy test

Questions asked

- Client's age
- Number of children client has
- Timing of last delivery or age of youngest child
- Client's STI status
- Whether client has chronic illnesses
- Whether the client is currently breastfeeding
- Timing of last menstrual period
- Regularity of menstrual cycle

Components of counseling : Pills

- Told the client when to take the pill
- Told the client what to do if pill is not taken in time or forgotten
- Warned the client of side effects that may occur
- Told the client should return to clinic if side effects continue
- Mentioned that method does not protect against sexually transmitted infections

Components of counseling : Injectables

- Told the client when to get injections
- Told the client what to do if miss a dose
- Warned the client of side effects that may occur
- Told the client to return to the clinic if side effects persist
- Mentioned that method does not protect against sexually transmitted infections

Components of counseling : Implants

- Told the client implants was good for 5 years
- Warned the client of side effects that may occur
- Told the client to return to the clinic if side effects persist
- Mentioned that method does not protect against sexually transmitted infections

Components of counseling : Intrauterine devices

- Told the client device was good for 10 years
- Told the client to check strings after menstruation
- Warned the client of side effects that may occur

- Whether client has a husband or boyfriend (partner status)
- Number of sexual partners
- Client's partner(s) attitude towards FP
- Whether client wants any or more children in the future
- Client's preference of contraceptive methods
- Told the client to return to the clinic if side effects persist
- Mentioned that method does not protect against sexually transmitted infections

Notes on list development:

We conducted a review of global family planning quality of care indicators[4] and included those feasible to measure by CV. (39,72,108,109)

[4] Personal communication, Amani Siyam, World Health Organization Quality of Care indicators, Draft. April 2017

Table 10: Providers sampled, those with completed in-person clinical vignettes, completed mobile phone clinical vignettes and those with both completed.

	Facility based		Health Surveillance Assistants		Community-based distribution agents		Total	
	n	%	n	%	n	%	n	%
Selected	213		178		177		568	
In-person CV completed	199	93.4	176	98.9	171	96.6	546	96.1
Phone-based CV completed	169	85.0	165	93.2	148	86.6	482	88.2
Both completed by provider	167	78.4	165	92.7	147	83.1	479	84.3
Both completed (3 case scenarios pooled by provider)	501	78.4	495	92.7	441	83.1	1437	84.3

Table 11: Characteristics of providers who completed in both the person and mobile phone based clinical vignette assessments

Provider characteristics	**% (n=479)**
Provider gender	
Female	45.7
Male	54.3
Provider age	
20-29	25.1
30-39	41.8
40-49	25.5
50+	7.7
Provider marital status	
Married	78.5
In a relationship, but not married	6.5
Separated/divorced or Widowed	8.4
Single	6.7
Provider religion	
Catholic Christian	19.0
Muslim	18.0
Protestant Christian	62.6
Other	0.4
Provider title	
Clinical technician/Medical assistant	8.8
Registered Nurse or midwife	2.9
Enrolled Nurse or midwife	15.7
Community Nurse or midwife	7.5
Health Surveillance Assistant (HSA)	34.4
Community Based Distribution Agent (CBDA)	30.7
Years at position	
0-1 years	7.3
2-5 years	31.7
6-10 years	17.3
11-20 years	30.7
>20 years	12.9
Provider education	
Primary or Secondary certificate	34.9
Malawi School Certificate of Education	28.6
College Certificate	15.9
College Diploma	19.0
Refused to answer	1.6

Table 12: Reliability analysis for in-person and mobile phone-based clinical vignettes for the components of counseling for pills, injectables, implants and intrauterine devices.

	% Pos. Agreement	% Neg. Agreement	Cohen's Kappa (95% CI)	PABAK* (95% CI)
Pills (n=479)				
When to take (pill daily)	93.1%	6.5%	0.0 (-0.1, 0.1)	0.7 (0.6, 0.8)
What to do if pill is not taken in time or forgotten	63.2%	49.4%	0.1 (0.0, 0.2)	0.1 (0.0, 0.2)
Warn of side effects that may occur	64.4%	48.2%	0.1 (0.0, 0.2)	0.1 (0.0, 0.2)
Should return to clinic if side effects continue	38.6%	71.6%	0.1 (0.0, 0.2)	0.2 (0.1, 0.3)
Method does not protect against sexually transmitted infections	30.2%	86.7%	0.2 (0.1, 0.3)	0.5 (0.4, 0.6)
Injectables (n=332)				
When to get injections	85.3%	27.5%	0.1 (0.0, 0.3)	0.4 (0.3, 0.5)
What to do if miss a dose	17.9%	70.1%	-0.1 (-0.1, 0.0)	0.3 (0.2, 0.4)
Warn of side effects that may occur	82.9%	24.7%	0.1 (0.0, 0.2)	0.3 (0.2, 0.4)
Return to the clinic if side effects persist	43.7%	58.4%	0.0 (-0.1, 0.1)	0.1 (-0.1, 0.2)
Mentioned that method does not protect against sexually transmitted infections	37.0%	74.6%	0.1 (0.0, 0.2)	0.3 (0.2, 0.4)
Implants (n=167)				
Good for 5 years	94.6%	100.0%	1.0 (0.9, 1.0)	1.0 (0.9, 1.0)
Warn of side effects that may occur	86.4%	22.5%	0.1 (-0.1, 0.3)	0.4 0.2, 0.5)
Return to the clinic if side effects persist	49.3%	46.8%	-0.0 (-0.2, 0.1)	0.0 (-0.2, 0.1)
Mentioned that method does not protect against sexually transmitted infections	54.4%	71.9%	0.2 (0.1, 0.4)	0.3 (0.2, 0.5)
Intrauterine device (n=167)				
Good for 10 years	60.8%	50.0%	0.1 (0.0, 0.3)	0.1 (0.0. 0.3)
Check strings after menstruation	61.1%	66.3%	0.3 (0.1, 0.4)	0.3 (0.1, 0.4)
Any side effects mentioned	78.8%	34.5%	0.1 (0.0, 0.3)	0.1 (0.0, 0.3)

Return to the clinic if side effects persist	47.3%	61.6%	0.1 (-0.1, 0.2)	0.1 (0.0, 0.3)
Mentioned that method does not protect against sexually transmitted infections	45.7%	71.1%	0.2 (0.0, 0.3)	0.3 (0.1, 0.4)

*Prevalence Adjusted Bias Adjusted Kappa

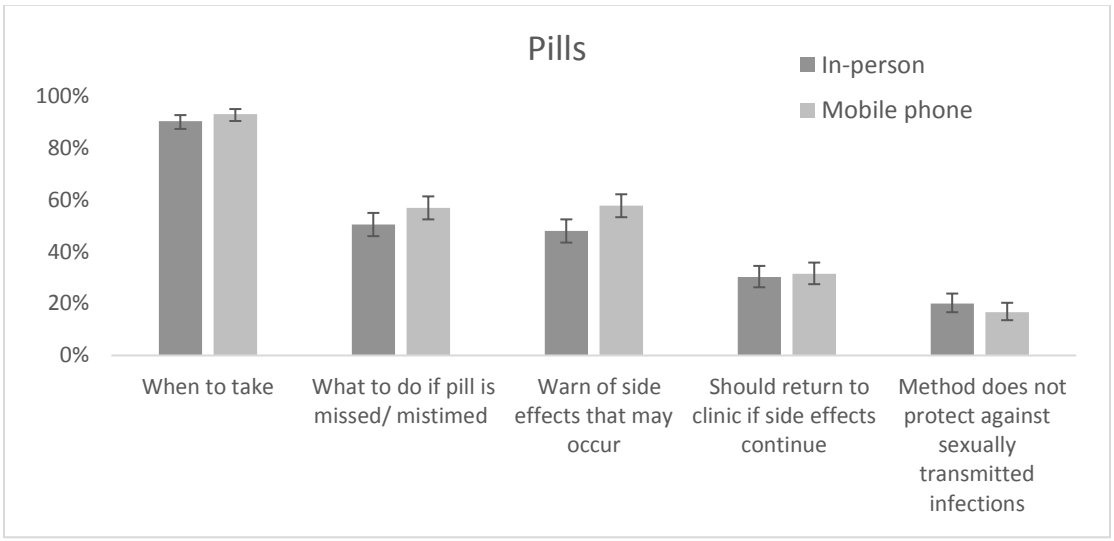
Table 13: Reliability analysis for in-person and mobile phone-based clinical vignettes for methods recommended, questions asked during client history and exams conducted, 3 case scenarios pooled

	% Pos. Agreement	% Neg. Agreement	Cohen's Kappa (95% CI)	PABAK*
Family planning method(s) recommended (n=1437)				
Pills	63.8%	61.8%	0.3 (0.2, 0.3)	0.3
Condoms	57.5%	61.0%	0.2 (0.1, 0.2)	0.2
Injectables	45.0%	77.9%	0.2 (0.2,0.3)	0.4
Implants	45.8%	72.9%	0.2 (0.1, 0.2)	0.3
Intrauterine device	45.8%	82.8%	0.3 (0.2, 0.4)	0.4
Sterilization	38.5%	90.8%	0.3 (0.2, 0.4)	0.7
Questions asked (n=1437)				
Contraceptive history	74.4%	49.8%	0.2 (0.1, 0.3)	0.4
Age of client	35.7%	75.5%	0.1 (0.1, 0.2)	0.1
Preferred family planning method	59.0%	51.9%	0.1 (0.1, 0.2)	0.1
Number of children	60.5%	60.7%	0.2 (0.2, 0.3)	0.2
Timing of last delivery	26.4%	83.6%	0.1 (0.0, 0.2)	0.5
Sexually transmitted infection status	39.6%	79.5%	0.2 (0.1, 0.3)	0.4
Chronic illnesses	39.4%	70.7%	0.1 (0.0, 0.2)	0.2
Currently breastfeeding	14.1%	95.1%	0.1 (0.0, 0.2)	0.8
Last menstrual period	41.1%	84.1%	0.2 (0.2, 0.3)	0.5
Regularity of menstrual cycle	19.5%	91.5%	0.1 (0.0, 0.2)	0.7
Number of current sexual partners	0.0%	96.3%	0.0 (0.0, 0.0)	0.9
Has a partner	42.0%	79.8%	0.2 (0.2, 0.3)	0.3
Partner attitude	22.5%	85.5%	0.1 (0.0, 0.1)	0.6

Desire for more (any) children	36.6%	82.5%	0.2 (0.1, 0.3)	0.4
Conduct any exams (n=996)	88.5%	51.5%	0.4 (0.3, 0.5)	0.6
Blood pressure	69.6%	61.0%	0.3 (0.2, 0.4)	0.3
Weight	31.1%	89.0%	0.2 (0.1, 0.3)	0.3
Check for anemia	34.3%	86.1%	0.2 (0.1, 0.3)	0.5
Pregnancy test	50.8%	70.5%	0.2 (0.1, 0.3)	0.2

*Prevalence Adjusted Bias Adjusted Kappa

Figure 8: Proportion of providers that mentioned counseling components for pills (n=479), injectables (n=332), implants (n=167) and intrauterine device (n=167) for the in-person and mobile phone-based clinical vignettes.



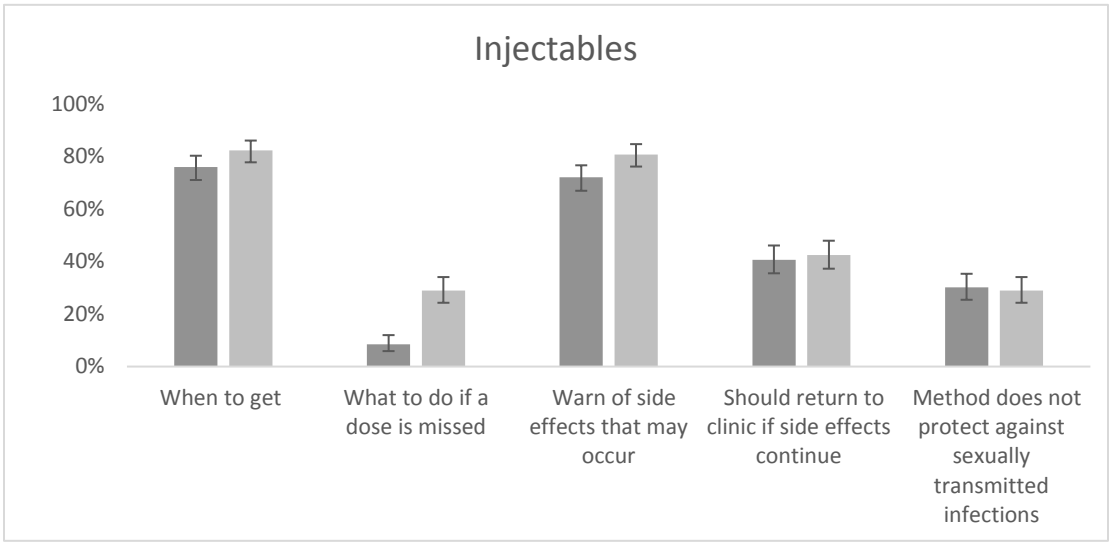
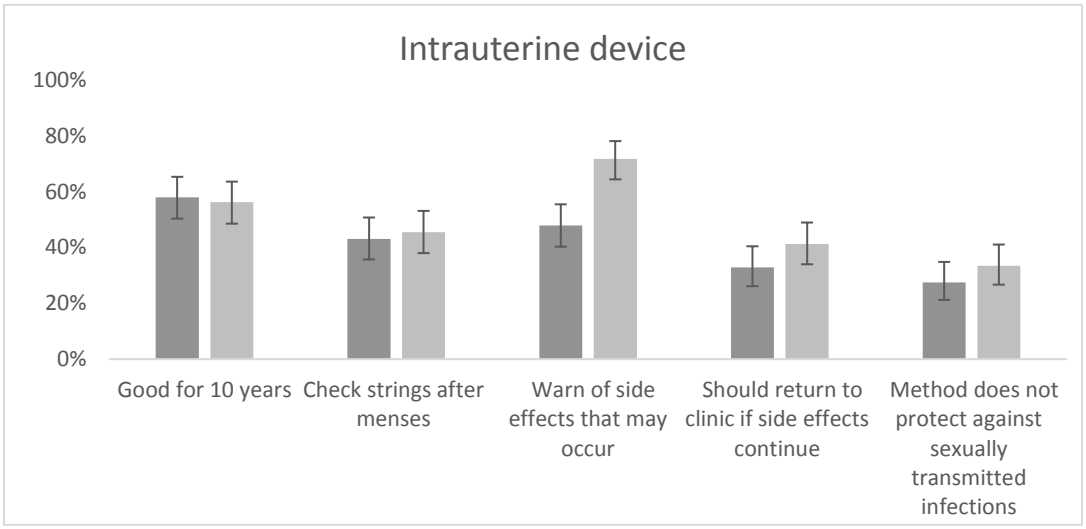


Figure 9 (cont'd): Proportion of providers that mentioned counseling components for pills (n=479), injectables (n=332), implants (n=167) and intrauterine device (n=167) for the in-person and mobile phone-based clinical vignettes.



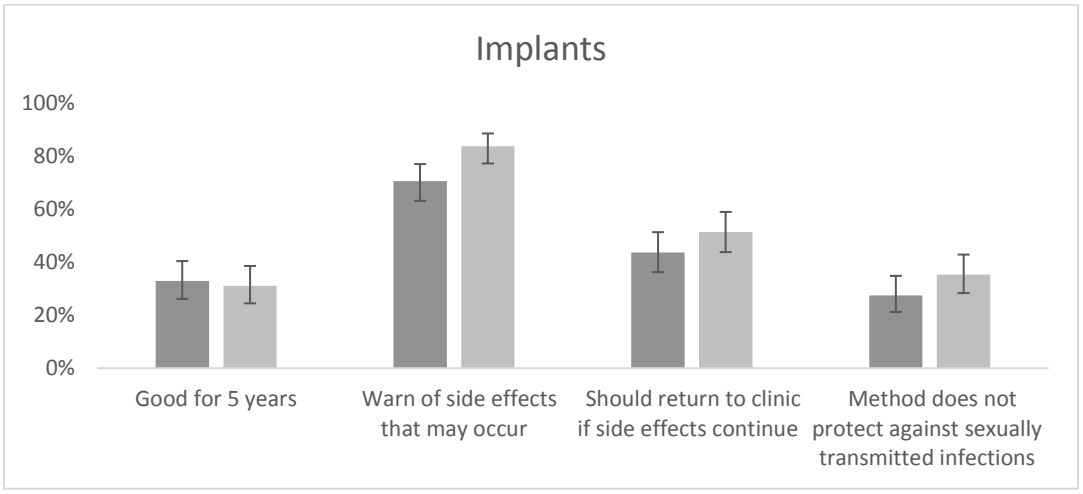


Figure 10: Proportion of providers that recommended family planning method(s) recommended by case scenario for the in-person and mobile phone-based clinical vignettes (n=479)

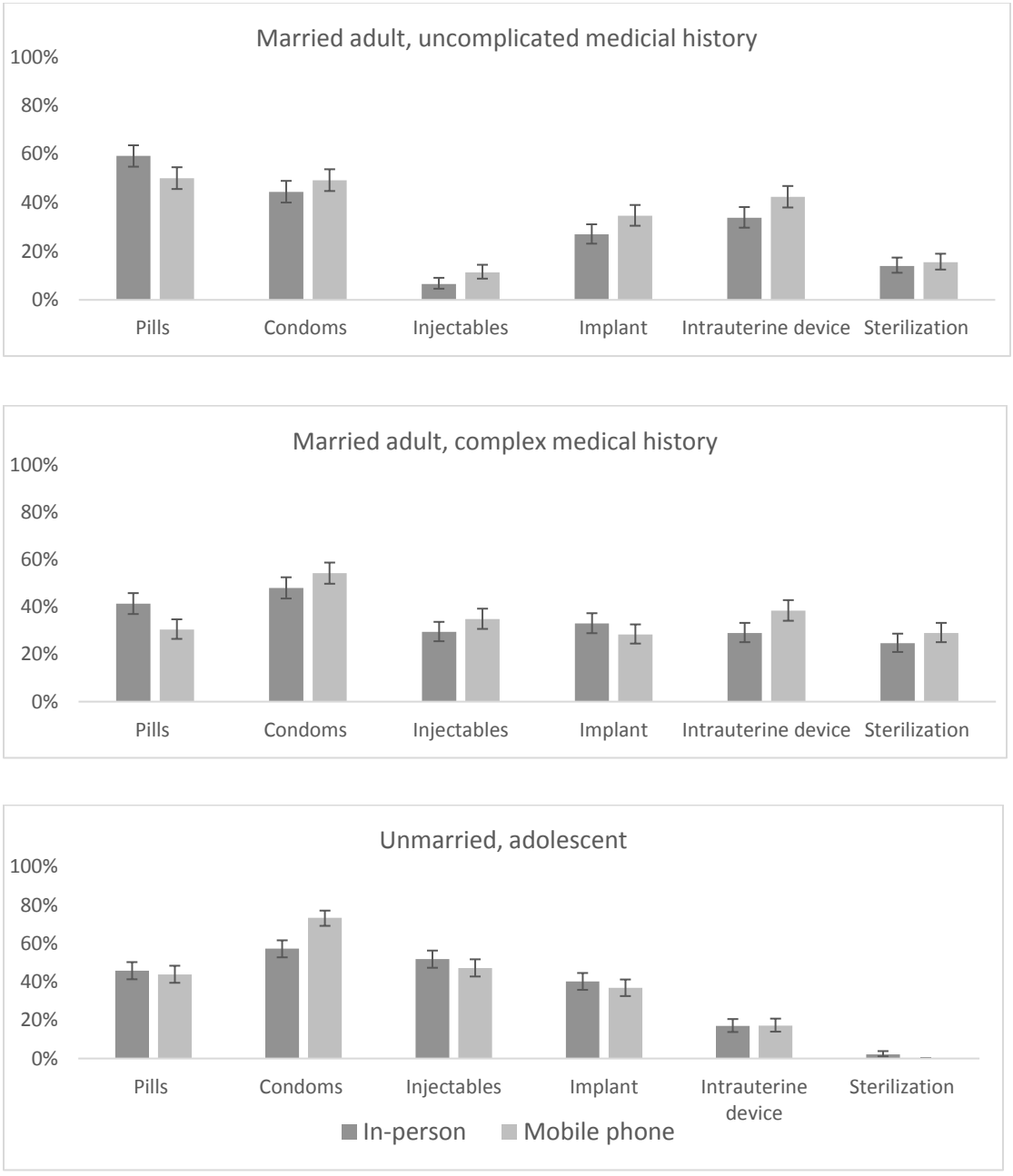
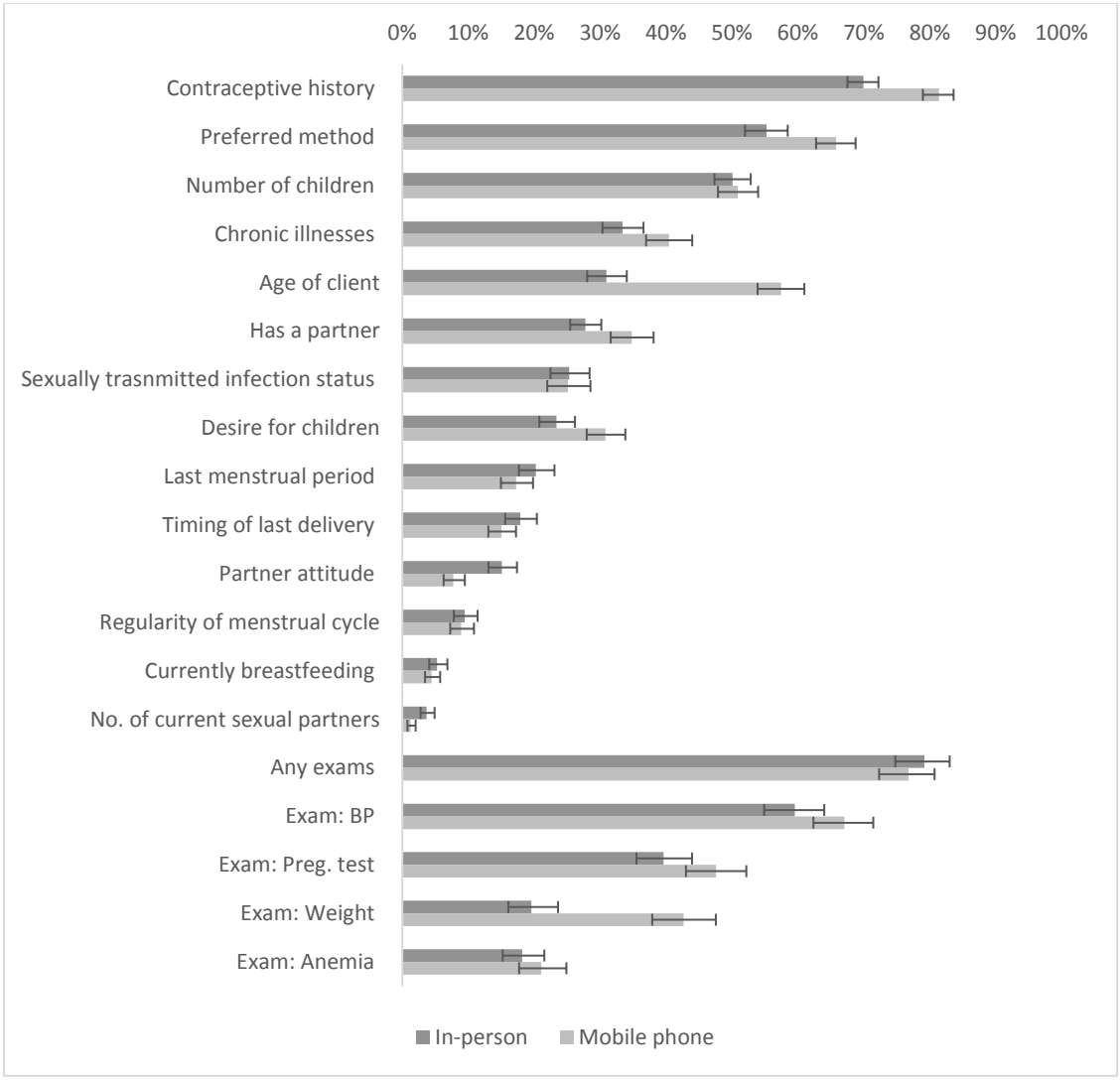


Figure 11: Proportion of providers that asked client history questions (n=1437) and recommended exams (n=996) for the 3 case scenarios pooled for in-person and mobile phone-based clinical vignettes.



Chapter 7: Discussion

Summary of findings

In paper 1, we documented instances of disrespectful care using a framework based on previous work in maternal health.(3) We noted some instances of disrespectful care, as defined by the Harris et al. framework, were likely due to generally poor structural (i.e. training and supervision) and/or process (i.e. poor or incomplete counseling) quality of care. We did uncover a low prevalence of instances of abuse. In 17.6% of the consultations, the SCs experienced humiliating treatment such as yelling, threatening, scolding, or being insulted. In 5.0% of the adolescent consultations, the SCs experienced judgmental comments related to their age. As discussed in paper 1, this prevalence is similar to other studies and we do not consider it specific to the Malawian context. Although the prevalence is low, the damage to the clients personally and their networks as they discuss the abuse with family or friends, could have a serious impact on utilization and trust of health services. Refusal of care because clients did not consent to HTC, TTV or other unrelated clinical procedures is a clear example of disrespectful care and how policy/guidelines can be misinterpreted and applied inappropriately in practice.

In paper 2, we found in-person clinical vignettes were not a valid measure of provider practices. It is not an unexpected finding given the "know-do gap" measured elsewhere. However, we noted several provider behaviors were statistically significantly done more often during the simulated client consultation than the provider later reported during the clinical vignettes. Something about the clinic environment or presentation of an actual client stimulated the provider to conduct certain behaviors more frequently.

In paper 3, we found poor reliability of the mobile phone administered compared to the in-person administered clinical vignette. This was due to universally increased provider behaviors reported

during the mobile phone clinical vignette which was always administered second. We believe we unintentionally replicated the conditions for retrieval practice which biased this comparison. It is important for future reliability studies on measuring provider knowledge to randomly allocate which test is administered first. However, we found the providers did not reliability recommend the case scenario's preferred contraceptive method (pills) between the two applications, indicative of a lack of consistency in reported family planning care but more work is needed to identify whether this is found in practice as well.

Public Health importance

Disrespectful care may impact utilization and the success of health programs and is a violation of the principles of health as a human right.(52) Malawi has a sexual and reproductive health policy that is focused on providing health services with respect and dignity, including youth. (67) A qualitative study in Malawi among adolescents shows evidence of mistrust and expectation of poor treatment when unmarried youth access family planning services.(71) This study did find that adolescent SCs received more complete counseling compared to the adult SCs. We were unable to determine whether this was because the adolescent SC was a first-time user or because of their age. Paper 1 shows evidence that adolescents in Malawi, especially first time users, can expect better quality care than adults who have previously used contraceptives. This could be interpreted as success of the Malawi youth-friendly family planning program but additional review and inputs are required from the Malawi Ministry of Health and partners. Regardless, even the low prevalence of judgement comments towards adolescents accessing family planning services may be negating the impact of youth-friendly family planning programs. Measuring respectful care offers insights on how programs are being delivered and the strengths and weaknesses of delivery.

Knowledge of quality practices is a prerequisite for quality provision but it does not guarantee it. (30) Having accurate and feasible tools for monitoring quality knowledge and practices is critical for LMICs

to meet their health system goals. However there is little information on the validity and reliability of these tools.(1,2) Paper 2 concludes there is little association between what providers report during an assessment and what they actually do during a consultation, without knowing they are being assessed. Important limitations bias the main conclusions on reliability in paper 3 but it documents the bias so that other may avoid it and provides interesting preliminary evidence on the effectiveness of repeated clinical vignettes on stimulating knowledge.

Recommendations for future research

We noted some of the instances of disrespect and abuse were linked to access to the health system, not just access to family planning services. It is important that globally, all countries consider and document possible instances of disrespectful care and abuse when clients interact with the health system. Simulated client protocols allow researchers and implementers to do this without reactivity bias. More work can be done exploring the provider-level factors related to poor client treatment. Qualitative studies with providers may be helpful to understand the underlying causes and could be used to develop interventions to reduce them. Poor quality of care such as long wait times and poor counseling may be framed as disrespectful care, given that access to quality health care is a human right. Further discussion is needed to determine whether this framing is useful as a separate construct from general health systems quality of care as defined by Donabedian and Bruce. (30,33)

In paper 2, we found the clinical vignette tool did not accurately measure all aspects of provider knowledge and more work is needed whether that is an issue with all clinical vignettes or just specific to our tool. Further studies are required to examine whether clinical vignettes can be reliability administered, especially via mobile-phone, but with randomization of the order of the assessments (paper 3). Finally, more exploratory work is needed to determine whether repeated application of clinical vignettes to stimulate previously learned knowledge through retrieval practice could be a useful continuing education tool.

In general, more studies are needed documenting the validity and reliability of tools measuring family planning quality of care. Program implementers may not be able to conduct "gold standard" quality of care assessments all the time but require information on the validity/reliability of all available methods in order to determine which tool is best fit for their needs.

Conclusions

Families should expect to encounter knowledgeable, proficient, and caring health providers when accessing services. In Malawi, we know through the simulated client encounters that many of the health providers went above and beyond what was expected of them to help the clients navigate their family planning options. The simulated clients reported being treated kindly, respectfully and with dignity in many of the encounters despite the pressures on providers working in a resource poor setting.

Measuring and providing data on quality of care identifies the strengths and weakness of health service delivery so that providers can be better supported by health systems. As quality of care emerges globally as a critical step in meeting population health needs, so is being able to accurately measure quality of care. Countries and program implementers require accurate, feasible and timely data on quality health services in order to improve delivery and health for all.

Appendices

Appendix A: Paper 1: Questions used in indicator of disrespectful care construction

Construct	Indicator	Questions used
Domain: Refusal of care		
Refusal of FP services due to non-essential procedures	% of consultations where the SCs did not receive method due to refusal of HIV test, TT vaccination or clinic was closed when it was supposed to be open	• Were you prescribed, given or referred for a method during this visit? • If no, referred to field notes for reason.
Domain: Non-private consultation		
Client services are not provided with visual or auditory privacy	% of consultations that took place in a group setting, or without visual and auditory privacy	• Did the provider talk to you about your family planning methods in a group or by yourself? • If individual counseling, was the consultation conducted in an area where no one could see you and provider? • If individual counseling, was the consultation conducted in an area where no one could hear your conversation?
Domain: Poor client-centered care		
Incomplete family planning options given by provider(s)	% of consultations where the provider did not mention any methods beyond what the SC requested (pills)	• Did the provider talk to you (or the group) about any contraceptive methods? • If yes, what contraceptive method(s) did the provider talk with you about?
Incomplete counseling given by provider(s)	Incomplete counseling: Did not mention all 4 counseling components below for SC given/prescribed pills and/or condoms	• Were you prescribed, given or referred for a method during this visit? • If yes, which method(s) were you prescribed/did you receive?
	1. Not counseled on correct use for pills/condoms	• If given/prescribed pills, did the provider tell you when to take (daily) and what to do if pill is not taken in time or forgotten? • If given/prescribed condoms, did the provider tell you how to properly use condom and that each condom can be used only one time?
	2. Not counseled on side effects for pills	• If given/prescribed pills, did the provider warn of side effects that may occur?

	3. Not told to return to clinic if side effects persist for pills	• If given/prescribed pills, did the provider tell you to return to clinic if side effects continue?
	4. Not told whether method protects against sexually transmitted infections for pills/condoms	• If given/prescribed pills, did the provider tell you method does not protect against sexually transmitted infections? • If given/prescribed condoms, did the provider tell you that method protects from pregnancy and against sexually transmitted infections?
Client unsupported in personal method choice	% of consultations where the provider advocated for a method during consultation	• Did the provider talk to you (or the group) about any contraceptive methods? • If yes, do you feel the provider advocated a specific method for you during the consultation?
	% of consultations where the provider did not ask client preference	• Did the provider talk to you (or the group) about any contraceptive methods? • If yes, did the provider ask you about your preference in contraceptive methods?
Poor listening and attention by provider(s)	% of consultations where the provider did not greet SCs (or the group) respectfully	• Did the provider greet you (or the group) respectfully?
	% of consultations where the provider interrupted the SCs while speaking or interrupted consultation for other business	• Did the provider interrupt you while you were speaking? • Did the provider interrupt the consultation to conduct other business?
Domain: Non-dignified care		

Clients experience humiliating treatment from providers or other health staff	% of consultations where the provider SCs experienced humiliating treatment such as yelling, threatening, scolding, or being insulted	• Did provider raise their voice or yell at you?
		• Did provider use a disparaging term to describe you?
		• Did provider do anything else considered disrespectful or abusive?
		• If yes, what did the provider say or do?
		• Did the provider make any critical or judgmental comments about:
		  • The number of children you have? Or do not have?
		  • Your plans for whether you want to have more children and when?

		• Your partner/marital status? • The involvement of your partner in your FP? • Your sexual activity? • The involvement of your parents? • Your age in regards to accessing family planning? • Your preferred method of contraceptives? • Your physical appearance? <u>Judgement comments by staff</u> • At any point, did you feel unwelcome by other health facility staff? • At any point, did other health facility staff make disrespectful or judgmental remarks to you or about you to others where you could overhear? • If yes, what did the staff say or do?
Clients are disempowered by the provider or staff	% of consultations where the SCs waited longer than one hour for services	• How long did you wait to be seen?
	% of consultations where the provider asked for additional money (informal payments)	• Did provider ask for additional money (informal payment)? • Did any other health facility staff ask you for additional money (informal payment)?

Notes on development:

We conducted a literature review of tools and indicators for measuring family planning quality of care. (39,72,108,109,120–123)[5] For each domain of the respectful care framework, we identified the constructs that could be measured given the study design and then mapped quality indicators identified through the review to each of the constructs. Then we adapted the questions from the tool review and derived some from a qualitative study on adolescent perceptions of family planning in Malawi. (71)

[5] Personal communication, Amani Siyam, World Health Organization Quality of Care indicators, Draft. April 2017

Appendix B: Paper 1 & 2: Description of case scenarios

1. Adult, married woman who is switching methods

Background

She began using Depo-Provera for the first time 6 weeks after the birth of her youngest child. She has heavy menstrual bleeding for the past six months. She went to clinic and got pills to treat it. But the heavy bleeding still continues. She went back to the clinic and got different pills to treat it but the bleeding still continues. She would like to stop taking the injections and change to a different method.

Partner information

She is married. Her husband is not supportive of her contraceptive use and wants more children.

Parity and fertility preference

She had three live birth and three living children. Her youngest child was born seven and half months ago. She does not want more children

Medical history

She is sexually active and not sexually active outside her marriage. And believes that she has no risk for sexually transmitted infections but has not been tested. She has no pregnancy symptoms. Her last period was 1 week ago and her cycle is usually regular. She is still breastfeeding some but has introduced solids. She had never smoked. Otherwise she is healthy.

Preference

She does not want to have an implant because her sister became pregnant due to a faulty implant. She is interested in learning about intrauterine devices but concerned about the side effects. She would like to take pills because she took them a long time ago and had no side effects.

2. Adolescent, unmarried woman who is a first time user

Background

The client is a 17 year old girl who wants to begin contraceptives.

Partner information

She and her boyfriend recently became sexually active. Her boyfriend doesn't like to use male condoms and neither really know how to use them.

Parity and fertility preference

She has no prior pregnancies. She would like to have children but wants to wait until she has completed school. She is afraid of getting pregnant.

Medical history

She is unmarried but sexually active with one partner (boyfriend). She has never used any form of birth control. She has no symptoms of pregnancy. Her last period was 1 week ago and her cycle is regular. She is not sexually active outside her relationship. She does not know her STI status and has never been tested. She does not smoke and is otherwise healthy.

Preference

Oral contraceptives: Several of her friends are using oral contraceptives, and they haven't gotten pregnant yet, even though they sometimes forget to take the pills. She thinks pills would be good for her too, but she is worried about forgetting to take the pills. She is also nervous about her parents finding her pills and knowing she is sexually active.

Appendix C: Paper 1: Additional illustrative quotes from field notes by domain or construct

Refusal of care
"Arrived around 8:00 am, after HIV/AIDS counselling, HSA took my health passport for HIV test after registration, he allowed me not to be tested. Then another HSA come with TTV (vaccine) injection, I tried to refuse the injection but was told that if I deny TTV I will not access FP services." – Adolescent SC *"Was told to come back another day because the provider was going away. So I came back without any method."* – Adolescent SC
HTC/TTV offered but FP services not contingent
"The FP provider told me to go for HIV testing. I told him that I am not ready for the test. He said that it is not compulsory that I get tested, but if I do not want to get tested, I should tell this to the HTC provider. The HTC provider also told me that it is ok if I do not want to get tested." – Adolescent SC *"The provider said it was compulsory to undergo for HIV test for them to compile my status in their report but I refused it. Later on the provider gave me pills because of being a student and fortunately the secondary school which I mentioned that I learn, she was also doing her part-time classes there. So the provider said I'm giving you the pills because we were learning at the same secondary school and just because of that she cannot let me go without receiving any family planning services."* – Adolescent SC *The provider told me that it was their policy that everyone should be tested for HIV/AIDS before they are given any family planning services. Because it was a must to undergo for VCT, I had no option but to exit the room, but fortunately, the male provider prescribed me condoms to use because I am a student and at the same time still young. He advised me that condom is the best."* – Adolescent SC
Non-private
"The family planning room had no visual privacy and we were more than 6 women in room to get family planning methods at once." – Adolescent SC
Poor client-centered care
"The provider after listening to my scenario he didn't ask my preferred method, he just said ok so I will give you this implant insisted of that injection. I escaped this by telling him what I wanted [was] the scenario suggested [pills]." – Adult SC
Inaccurate information
"One of the HSA who was providing the contraceptive injectable told me that I am too young to access FP methods. FP methods will destroy my bones." - Adolescent SC *"During group counselling the provider (HSA) warned us 'don't get tempted to use some of these satanic family planning methods like the implant. Whites are clever they always want to try out things on us blacks and Asians. Some of these are not good. They will just drain your blood'."* - Adult SC
Non-dignified care

"One of the health surveillance assistant who was also assisting FP client's was proposing me for a relationship. [He was saying…] *'Give me your number. Let us meet somewhere away from the facility for where we can discuss. Where do you live? Please, be serious. I am serious. You can flash me on this number' "* - Adolescent SC *"[Provider working at NGO] stationed at the Health Centre forced me to go for an HIV test, I refused. She raised her voice at me for refusing to get tested. Nevertheless, we had both group counseling and individual counseling."* – Adult SC
Long wait times
"Had to wait for about 4 hours to be assisted because the family planning provider was also the same person attending to antenatal, under 5 and the maternity wing." – Adult SC *"I waited for 3 hours to get assisted. It took so long to get assisted because they start with antenatal then family planning services."* – Adolescent client
Informal payments
The provider told us in a group that everyone should be menstruating of which he was to check to confirm, if everyone should undergo for a pregnancy test, which was worth K1, 000 to receive a service. This was for those who wanted to start using family planning (first time). – Adult SC (also reported by Adolescent SC at that clinic) *"I was not prescribed pills though but was rather given condoms because the provider said the only pills available at the hospital were being sold at MK30 per strip because they belonged to [NGO]."* – Adult SC (Adolescent SC reported receiving pills at from this provider)
Example of supportive provider
"After entering the room, she asked me where your old health passport is. I said, I don't have, my husband took it and I don't know where it is. She said why did he do that? I said he is not supportive of using contraceptive methods. Then she said ok, don't worry it happens, most men like doing that, so should I write the method of family planning I have given you in this passport? Where are you going to keep it now? I said I have a friend; she will keep it for me. Then she asked what method do you want? I said pills. She said we don't have pills; instead I will give you 3 months injectable, and then I said no, if possible give me condoms. Then she laughed, saying how are you going to convince him, since he is not supportive of using contraceptive methods? I said he is my husband, I will convince him. She gave me 45 condoms." – Adult SC

Appendix D: Paper 2: Analysis by adult and adolescent case scenarios

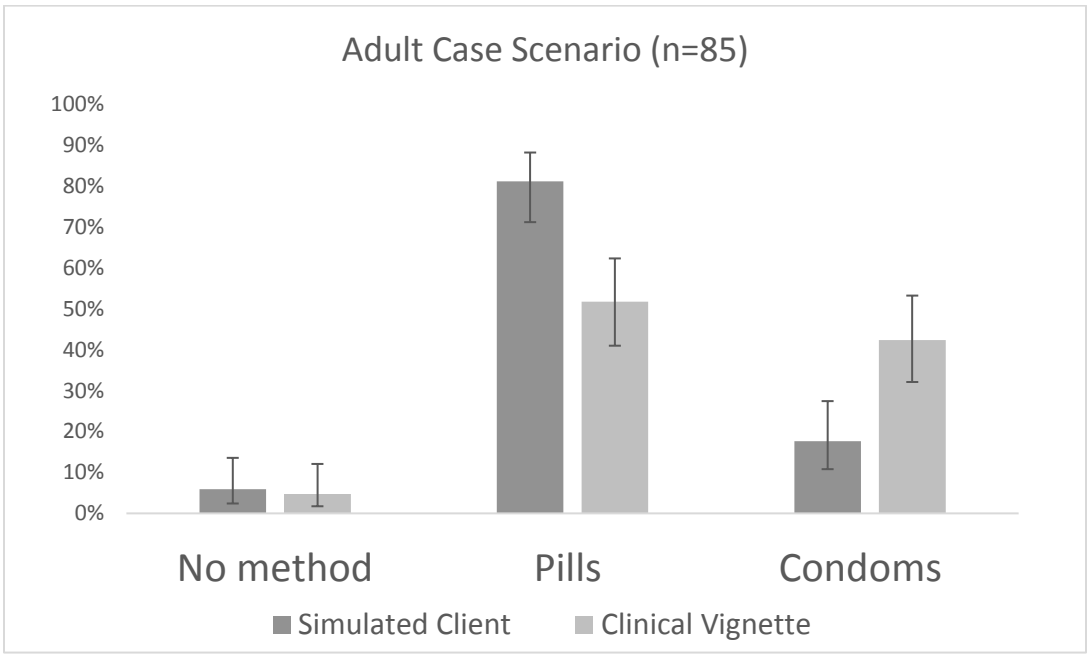
Appendix D1: Validation analysis comparing the simulated client consultation and the clinical vignette interview for the Adult and Adolescent case scenarios for indicators with sufficient sample size only*

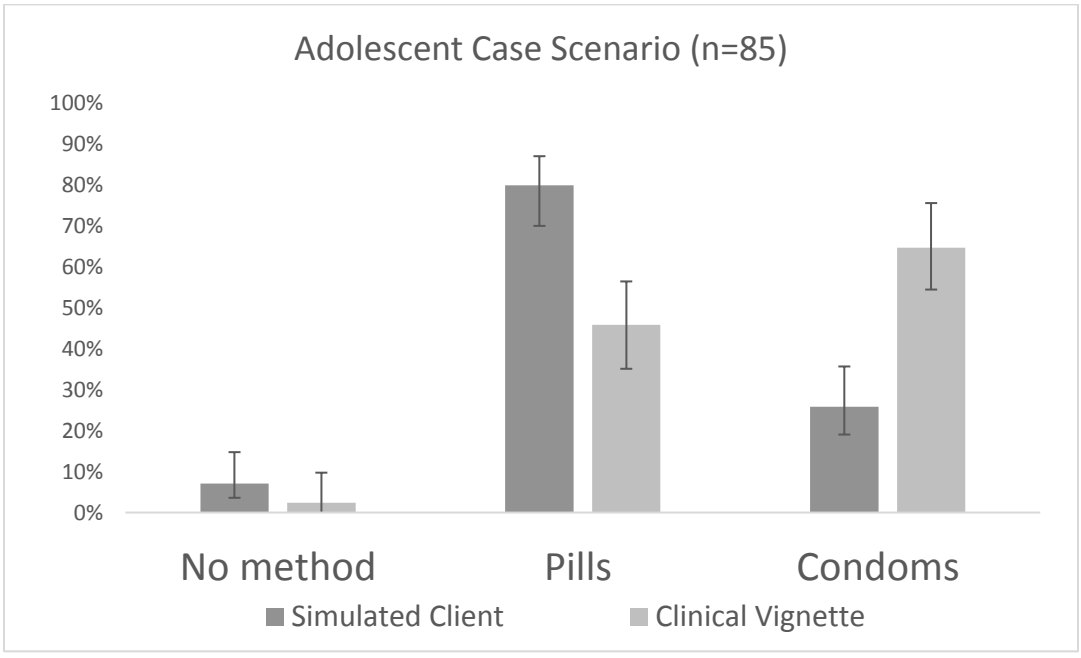
	Adult SC (n=85)				**Adolescent SC (n=85)**			
	Percent agreement	Sensitivity (95% CI)	Specificity (95% CI)	Area under ROC¥ curve (95% CI)	Percent agreement	Sensitivity (95% CI)	Specificity (95% CI)	Area under ROC¥ curve (95% CI)
Received/prescribed any FP method								
Pills	51.8%	52.2% (39.8%, 64.4%)	50.0% (24.7%, 75.3%)	0.5 (0.4, 0.7)	42%	42.6% (30.7%, 55.2%)	41.9% (18.4%, 67.1%)	0.4 (0.3, 0.6)
Condoms	na	na	na	na	38%	54.5% (32.2%, 75.6%)	31.7% (20.6%, 44.7%)	0.4 (0.3, 0.6)
Questions asked during consultation								
Age	37.7%	35.3% (24.1%, 47.8%)	47.1% (23.0%, 72.2%	0.4 (0.3, 0.6)	na	na	na	na
Number of children	38.8%	32.9% (22.1%, 45.1%)	66.7% (38.4%, 88.2%)	0.5 (0.4, 0.6)	44.7%	44.3% (32.4%, 56.7%)	46.7% (21.3%, 73.4%)	0.5 (0.3, 0.6)
STI status	na	na	na	na	70.6%	48.1% (28.7%, 68.1%)	81.0% (68.6%, 90.1%)	0.7 (0.5, 0.8)
Last menstrual period	na	na	na	na	62.4%	25.0% (8.66%, 49.1%)	73.9% (61.5%, 84.0%)	0.5 (0.4, 0.6)
Partner status	na	na	na	na	47.1%	44.9% (30.7%, 59.8%)	50.0% (32.9%, 67.1%)	0.5 (0.4, 0.6)
Method preference	54.1%	63.0% (42.4%, 80.6%)	50.0% (36.6%, 63.4%)	0.6 (0.5, 0.7)	58.8%	75.5% (61.1%, 86.7%)	36.1% (20.8%, 53.8%)	0.6 (0.5, 0.7)
Exams								
Weight	52.9%	42.9% (17.7%, 71.1%)	54.9% (42.7%, 66.8%)	0.5 (0.3, 0.6)	47.2%	64.3% (35.1%, 87.2%	43.1% (30.2%, 56.8%	0.5 (0.4, 0.7)
Components of counseling among those who received/prescribed pills (Adult n=69; Adolescent n=68)								

What to do if pill is not taken in time/ forgotten	49.3%	66.7% (41.0%, 86.7%)	43.1% (29.3%, 57.8%)	0.6 (0.4, 0.7)	45.6%	58.8% (32.9%, 81.6%)	41.2% (27.6%, 55.8%)	0.5 (0.4, 0.6)
Warn of side effects that may occur	46.4%	69.6% (47.1%, 86.8%)	34.8% (21.4%, 50.2%)	0.5 (0.4, 0.6)	58.8%	73.2% (57.1%, 85.8%)	37.0% (19.4%, 57.6%)	0.6 (0.4, 0.7)
Should return to clinic if side effects continue	63.8%	42.9% (21.8%, 66.0%)	72.9% (58.2%, 84.7%)	0.6 (0.5, 0.7)	45.6%	29.7% (15.9%, 47.0%)	64.5% (45.4%, 80.8%)	0.5 (0.4, 0.6)
Method does not protect against sexually *transmitted infections*	na	na	na	na	60.3%	26.9% (11.6%, 47.8%)	81.0% (65.9%, 91.4%)	0.5 (0.4, 0.7)

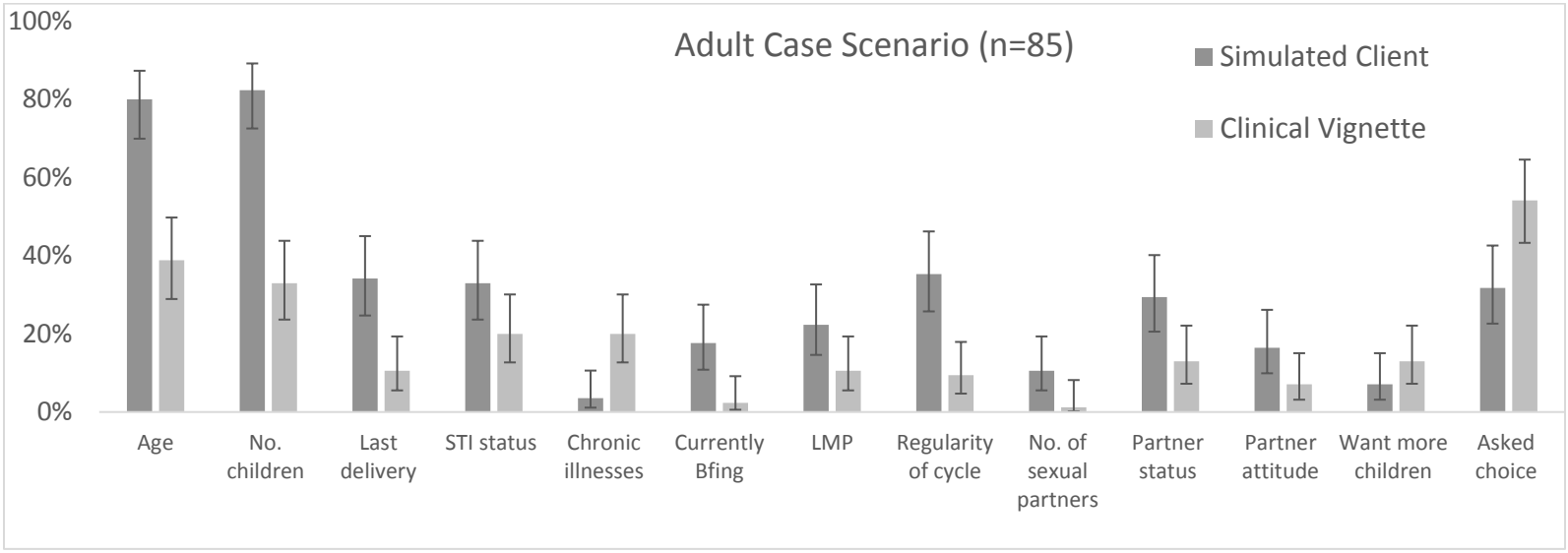
na – Sample size too small to evaluate validity (Less than 5 observations in one or more cells of the 2x2 table); *5 or more sample size in all cells of the 2x2 table; ¥ Receiver Operating Characteristic

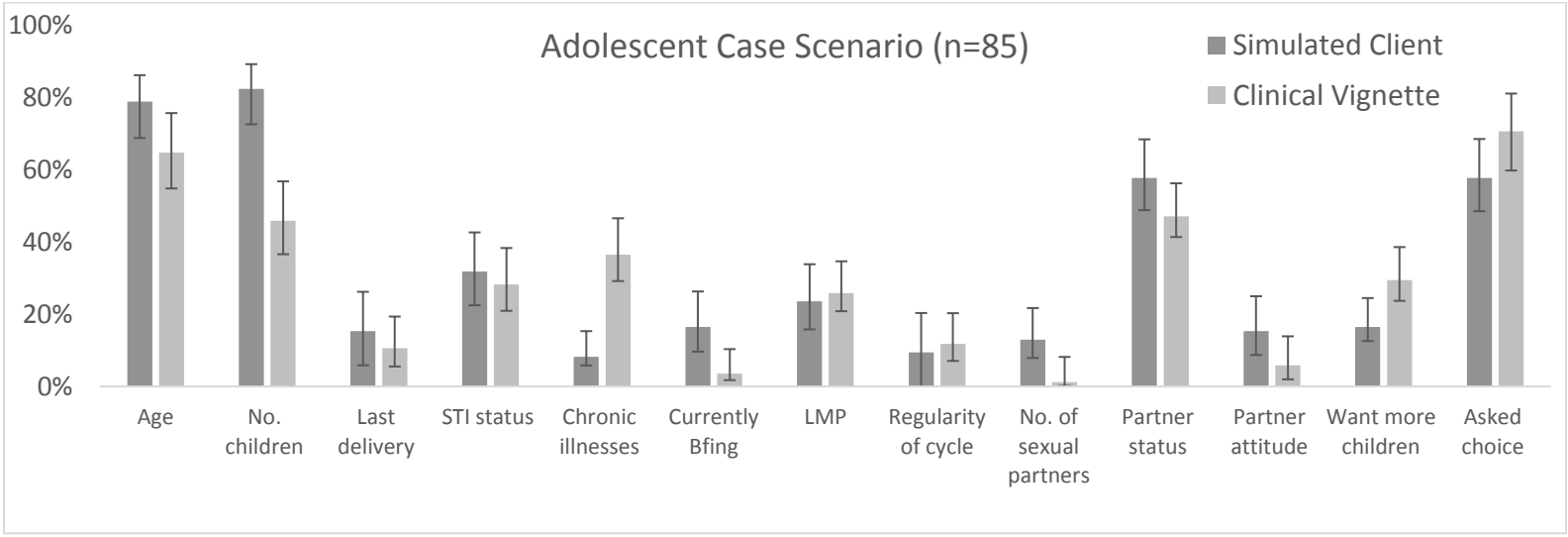
Appendix D2: Family planning method(s) recommended during the simulated client consultation and the clinical vignette interview for the Adult and Adolescent case scenarios



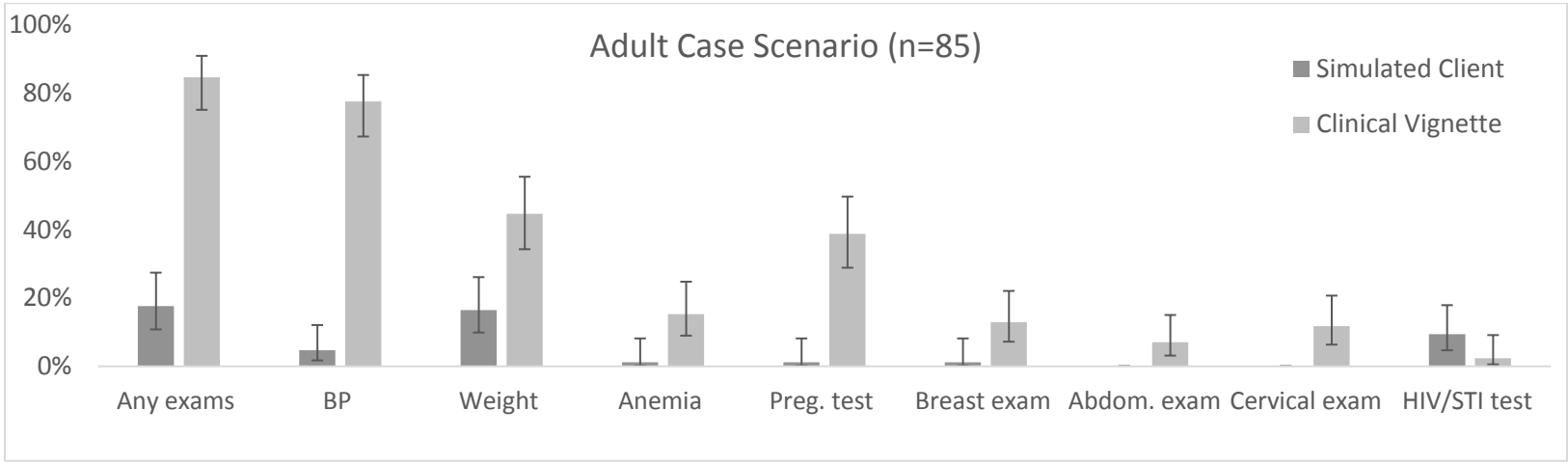


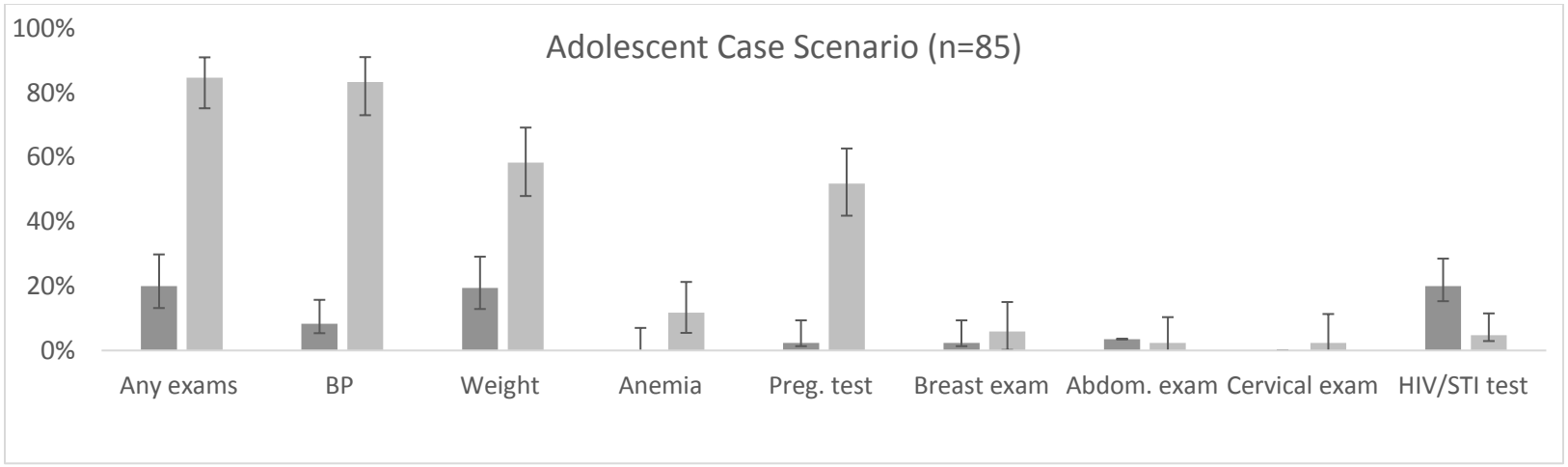
Appendix D3: Questions asked when taking client history during the simulated client consultation and the clinical vignette interview for the Adult and Adolescent case scenarios



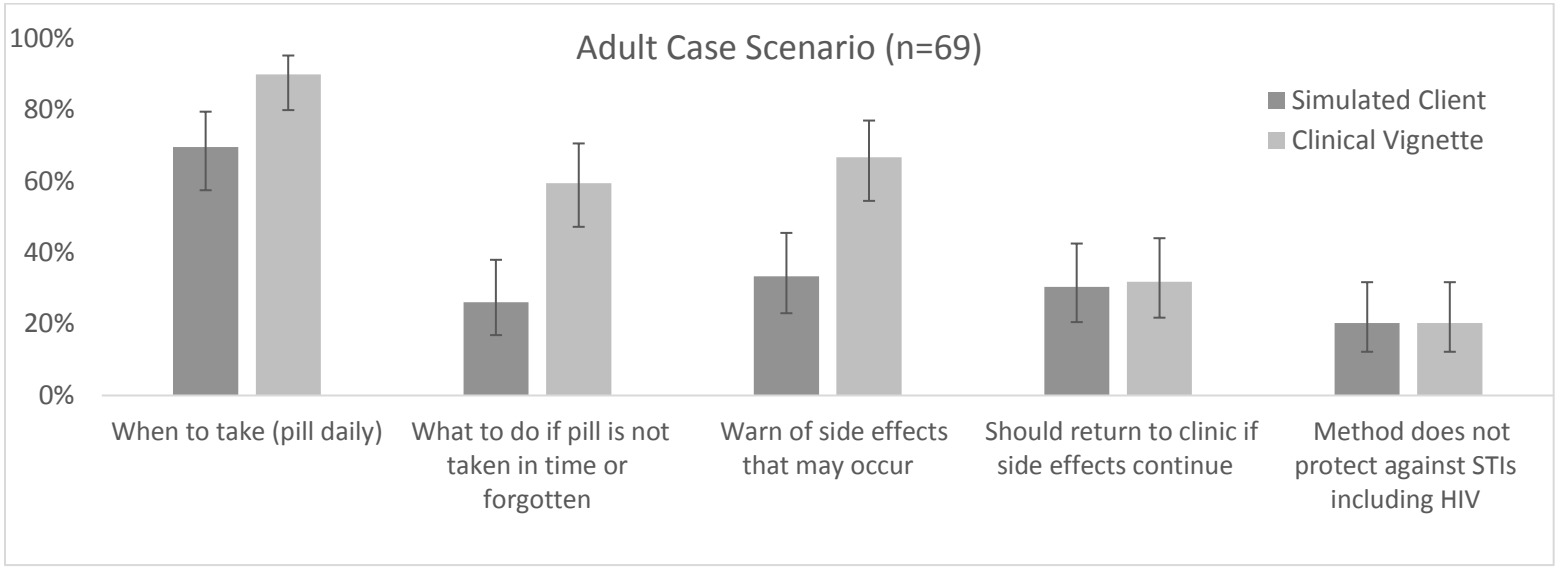


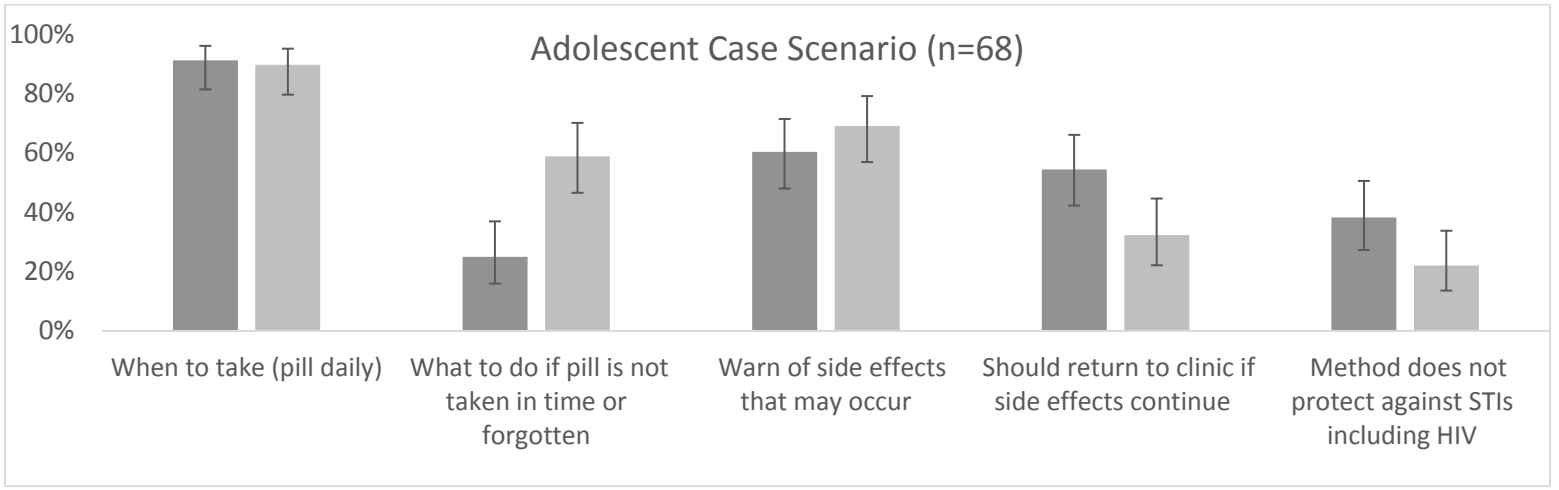
Appendix D4: Exams recommended during the simulated client consultation and the clinical vignette interview for the Adult and Adolescent case scenarios





Appendix D5: Quality counseling during the simulated client (SC) consultation and the clinical vignette interview for the Adult and Adolescent case scenarios for the SCs who were prescribed/given pills





Appendix E: Paper 3: Description of three case scenarios

E1: Married Adult with uncomplicated medical history case scenario description

The client is a woman who would like to switch family planning methods. The women appears to be in her late twenties. What questions would you ask this woman during a FP consultation?

Contraceptive history

She began using Depo-Provera for the first time 6 weeks after the birth of her youngest child. She has heavy menstrual bleeding for the past six months. She went to clinic and got pills to treat it. But the heavy bleeding still continues. She went back to the clinic and got different pills to treat it but the bleeding still continues. She would like to stop taking the injections and change to a different method.

Ask about the client's choice of method

She does not want to have an implant because her sister became pregnant due to a faulty implant. She is interested in learning about intrauterine devices but concerned about the side effects. She would like to take pills because she took them a long time ago and had no side effects.

Last delivery date / age of youngest child

Her youngest child was born seven and half months ago.

Number of children

She has three children

Whether the client is still breastfeeding.

She is breastfeeding some but has introduced solid foods to her child.

Last menstrual period

Her last period was 1 week ago.

Regularity of menstrual cycle.

Her cycle is regular.

Desire for more children

She does not want more children

Partner status

She is married

Partner attitude towards FP

Her husband less supportive of her contraceptive use and would like more children.

How many sexual partners she has

She is not sexually active outside her marriage. And believes that she has no risk for sexually transmitted infections.

Smoking status

She does not smoke.

STI status

She does not know her STI status. She has never been tested for sexually transmitted infections.

Chronic illness (example: diabetes, heart disease, others)

She is otherwise healthy.

Her age

She is 29

Clinical exam results: blood pressure

Her blood pressure is normal

Clinical exam results: weight

She is within normal range of weight for her age and height.

Clinical exam results: Pregnancy test

The pregnancy test is negative

Clinical exam results: Check for anemia

Exam shows no signs of anemia

Any other exam is mentioned

All other findings are normal

E2: Married Adult with complex medical history case scenario description

The client is a woman who would like to begin using contraceptives. The woman appears to be in her early thirties. What questions would you ask this woman during a FP consultation?

Contraceptive history

She has never used modern birth control. She practices the withdrawal method.

Ask about the client's choice of method

She is frightened of injections and her husband does not like to use condoms. She has heard that pills are easy to use and effective; she'd like to give them a try.

Last delivery date / age of youngest child

Her youngest child was born two years ago

Number of children

She has three children.

Whether the client is still breastfeeding.

She is no longer breastfeeding.

Last menstrual period

Her last period was two weeks ago

Regularity of menstrual cycle.

Her period is regular.

Desire for more children

While she is not certain that she has all the children she wants, she does know that she is not interested in having another child for at least several years.

Partner status

She is married

Partner attitude towards FP

Her husband does not want her to use contraceptives because he thinks there is a risk of sterility.

How many sexual partners she has

She is not sexually active outside her marriage. She was diagnosed as HIV positive two years ago.

Smoking status

She does not smoke.

STI status

She was diagnosed as HIV positive two years ago.

Chronic illness (example: diabetes, heart disease, others)

She was diagnosed with tuberculosis 8 months ago and she tested positive for HIV two years ago. She is on ART and TB medication. Her HIV and TB infections are well controlled.

Her age

She is 31.

Clinical exam results: blood pressure

Her blood pressure is 165/90

Clinical exam results: weight

She is within normal range of weight for her age and height.

Clinical exam results: Pregnancy test

Pregnancy test is negative.

Clinical exam results: Check for anemia

Exam shows no signs of anemia

Any other exam is mentioned

All other findings are normal

E3: Unmarried adolescent case scenario description

The client is a woman who would like to begin using contraceptives. The woman appears to be in her late teens. What questions would you ask this woman during a FP consultation?

Contraceptive history

She has never used any form of birth control.

Ask about the client's choice of method

Several of her friends are using oral contraceptives, and they haven't gotten pregnant yet, even though they sometimes forget to take the pills. She thinks pills would be good for her too, but she is worried about forgetting to take the pills. She is also nervous about her parents finding her pills and knowing she is sexually active.

Last delivery date / age of youngest child

She has no prior pregnancies

Number of children

She's had no prior pregnancies

Whether the client is still breastfeeding.

She's had no prior pregnancies

Last menstrual period

Her last period was 1 week ago.

Regularity of menstrual cycle.

Her period is regular.

Desire for more children

She would like to have children but wants to wait until she has completed school. She is afraid of getting pregnant.

Partner status

She is unmarried but sexually active with one partner (boyfriend).

Partner attitude towards FP

She and her boyfriend recently became sexually active. Her boyfriend doesn't like to use male condoms and neither really know how to use them.

How many sexual partners she has

She is not sexually active outside her relationship. And believes that she has no risk for sexually transmitted infections.

Smoking status

She does not smoke.

STI status

She does not know her STI status. She has never been tested.

Chronic illness (example: diabetes, heart disease, others)

She is otherwise healthy.

Her age

She is 17.

Clinical exam results: blood pressure

Her blood pressure is normal

Clinical exam results: weight

She is within normal range of weight for her age and height.

Clinical exam results: Pregnancy test

Pregnancy test is negative.

Clinical exam results: Check for anemia

Exam shows no signs of anemia

Any other exam is mentioned

All other findings are normal

Appendix F: Paper 3: Reliability analysis by case scenario

F1: Reliability analysis for in-person and mobile phone-based clinical vignettes for methods recommended, questions asked during client history and exams conducted for the **Married, adult uncomplicated medical history case scenario** (n=479)

	% Pos. Agreement	% Neg. Agreement	Kappa	Kappa – LL*	Kappa - UL¥	PABAK¤	PABAK – LL*	PABAK - UL¥
FP methods recommended								
Pills	60.2%	64.6%	0.2	0.2	0.3	0.2	0.2	0.3
Condoms	54.9%	55.3%	0.1	0.0	0.2	0.1	0.0	0.2
Injectables	9.7%	88.6%	0.0	-0.1	0.1	0.7	0.6	0.7
Implants	45.7%	69.4%	0.1	0.1	0.2	0.3	0.2	0.4
Intrauterine devices	61.1%	67.2%	0.3	0.2	0.4	0.3	0.2	0.4
Sterilization	32.8%	87.4%	0.2	0.1	0.3	0.6	0.5	0.7
Natural methods	6.9%	97.6%	0.1	-0.1	0.2	0.8	0.8	0.9
Abstain	NA		NA	NA	NA	NA	NA	NA
No method recommended	93.5%	15.0%	0.1	-0.1	0.2	0.8	0.8	0.9
Questions asked								
Contraceptive history	95.1%	14.3%	0.1	-0.1	0.2	0.9	0.8	0.9
Client age	53.7%	52.4%	0.0	0.0	0.1	0.1	0.0	0.1
Preferred method	66.7%	44.1%	0.1	0.0	0.2	0.1	0.0	0.2
Number of children	51.5%	60.4%	0.1	0.0	0.2	0.2	0.1	0.3
Last delivery	22.2%	85.4%	0.1	0.0	0.2	0.5	0.4	0.6
Sexually transmitted infection status	35.4%	82.0%	0.2	0.1	0.3	0.5	0.4	0.6
Chronic illnesses	39.7%	66.8%	0.1	0.0	0.2	0.2	0.1	0.3
Currently breastfeeding	12.0%	97.1%	0.1	0.0	0.3	0.9	0.8	0.9
Last menstrual period	20.0%	91.3%	0.1	0.0	0.2	0.7	0.6	0.7
Regularity of menstrual cycle	16.0%	92.3%	0.1	0.0	0.2	0.7	0.6	0.8
No. of current sexual partners	0.0%	99.8%	0.0	0.0	0.0	1.0	0.9	1.0

Has a partner	31.7%	79.5%	0.1	0.0	0.2	0.5	0.4	0.6
Partner attitude	2.6%	95.2%	0.0	0.1	0.0	0.8	0.7	0.8
Desire for more children	30.8%	82.9%	0.1	0.0	0.2	0.5	0.4	0.6
Conduct any exams	86.3%	57.1%	0.4	0.3	0.5	0.6	0.5	0.7
Blood pressure	80.6%	47.8%	0.3	0.2	0.4	0.3	0.2	0.4
Weight	75.5%	63.1%	0.2	0.1	0.3	0.3	0.2	0.4
Check for anemia	45.7%	82.5%	0.3	0.2	0.4	0.5	0.4	0.5
Pregnancy test	50.6%	61.5%	0.1	0.0	0.2	0.2	0.1	0.3

* Lower Limit; ¥ Upper Limit; ǂ Prevalence Adjusted Bias Adjusted Kappa

F2: Reliability analysis for in-person and mobile phone-based clinical vignettes for methods recommended, questions asked during client history and exams conducted for the **Married, adult complex medical history case scenario** (n=479)

	% Pos. Agreement	% Neg. Agreement	Kappa	Kappa – LL*	Kappa - UL¥	PABAK ¤	PABAK – LL*	PABAK - UL¥
FP methods recommended								
Pills	44.4%	79.4%	0.2	0.2	0.3	0.3	0.2	0.4
Condoms	63.0%	53.8%	0.2	0.1	0.3	0.2	0.1	0.3
Injectables	41.8%	68.1%	0.1	0.0	0.2	0.2	0.1	0.3
Implants	35.4%	75.1%	0.1	0.0	0.2	0.2	0.2	0.3
Intrauterine devices	59.0%	70.0%	0.3	0.2	0.4	0.3	0.3	0.4
Sterilization	50.9%	78.1%	0.3	0.2	0.4	0.4	0.3	0.5
Natural methods	0.0%	98.9%	0.0	0.0	0.0	0.9	0.8	0.9
Abstain	0.0%	98.9%	0.0	0.0	0.0	1.0	1.0	1.0
No method recommended	97.4%	8.3%	0.1	-0.1	0.2	0.9	0.9	0.9
Questions asked								
Contraceptive history	81.4%	27.1%	0.1	0.0	0.2	0.3	0.2	0.4
Client age	68.4%	43.7%	0.1	0.0	0.2	0.1	0.0	0.1
Preferred method	69.6%	39.4%	0.1	0.0	0.2	0.1	0.0	0.2
Number of children	73.2%	45.3%	0.2	0.1	0.3	0.3	0.2	0.4
Last delivery	26.1%	83.5%	0.1	0.0	0.2	0.4	0.3	0.5
Sexually transmitted infection status	40.7%	76.4%	0.2	0.1	0.3	0.3	0.3	0.4
Chronic illnesses	57.6%	58.0%	0.2	0.1	0.2	0.2	0.1	0.2
Currently breastfeeding	12.5%	96.0%	0.1	0.0	0.2	0.8	0.8	0.9
Last menstrual period	37.6%	83.7%	0.2	0.1	0.3	0.5	0.4	0.6
Regularity of menstrual cycle	20.0%	90.4%	0.1	0.0	0.2	0.7	0.7	0.8
No. of current sexual partners	0.0%	97.9%	0.0	0.0	0.0	0.9	0.9	0.9
Has a partner	43.2%	70.6%	0.1	0.0	0.2	0.3	0.2	0.4
Partner attitude	17.7%	91.0%	0.1	0.0	0.2	0.6	0.5	0.7

Desire for more children	49.7%	73.8%	0.2	0.1	0.3	0.3	0.2	0.4
Conduct any exams	85.0%	57.6%	0.4	0.3	0.5	0.6	0.5	0.7
Blood pressure	79.9%	53.4%	0.3	0.2	0.4	0.4	0.3	0.5
Weight	60.3%	64.5%	0.2	0.1	0.3	0.3	0.2	0.4
Check for anemia	31.1%	84.3%	0.1	0.0	0.3	0.5	0.5	0.6
Pregnancy test	58.5%	64.9%	0.2	0.1	0.3	0.2	0.1	0.3

* Lower Limit; ¥ Upper Limit; ¤ Prevalence Adjusted Bias Adjusted Kappa

F3: Reliability analysis for in-person and mobile phone-based clinical vignettes for methods recommended, questions asked during client history and exams conducted for the **Unmarried, adolescent case scenario** (n=479)

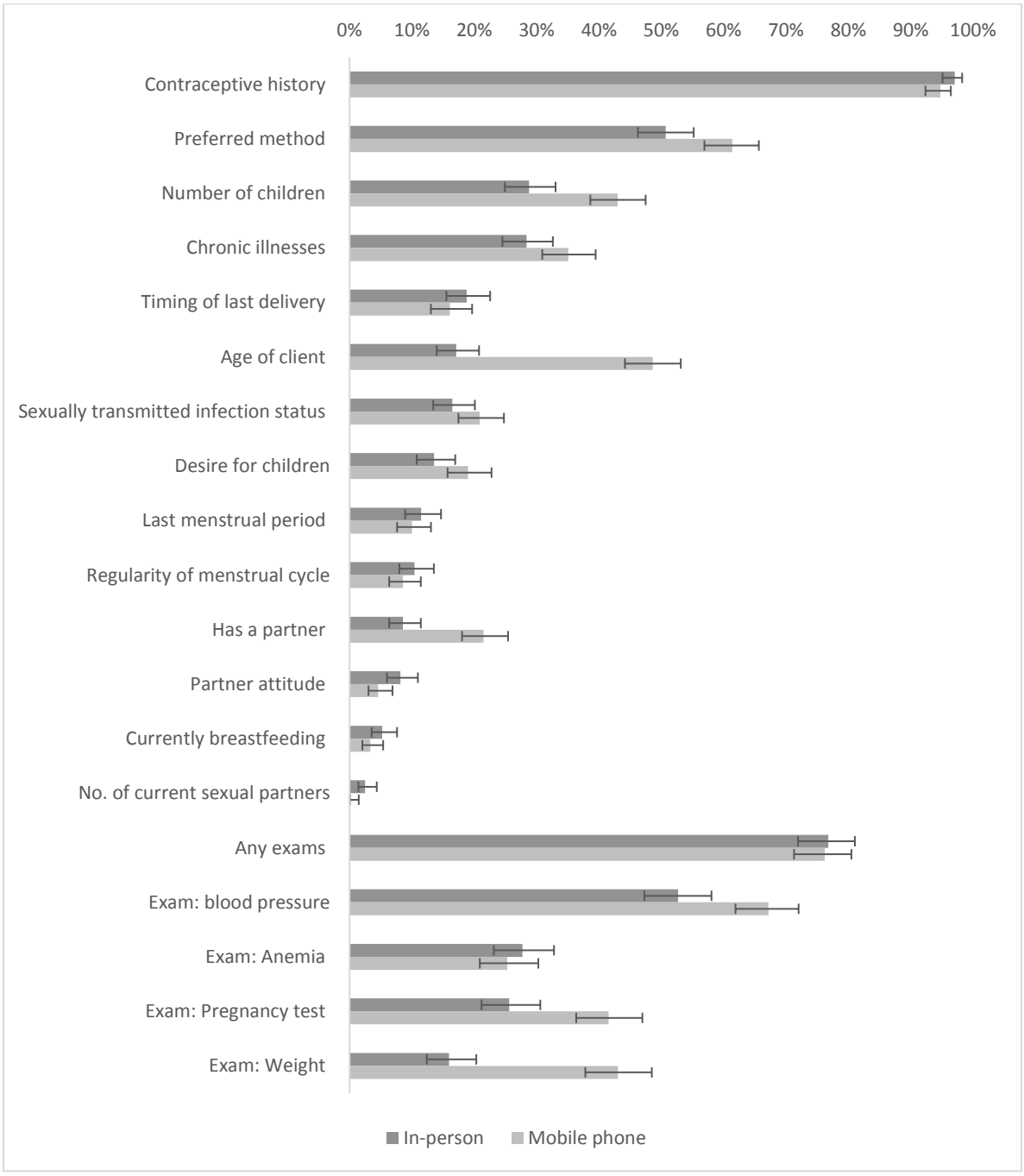
	% Pos. Agreement	% Neg. Agreement	Kappa	Kappa – LL*	Kappa - UL¥	PABAK¤	PABAK – LL*	PABAK - UL¥
FP methods recommended								
Pills	55.3%	65.8%	0.2	0.1	0.3	0.2	0.1	0.3
Condoms	82.1%	38.5%	0.2	0.1	0.3	0.3	0.2	0.4
Injectables	56.1%	62.3%	0.2	0.1	0.3	0.2	0.1	0.3
Implants	54.2%	74.9%	0.3	0.2	0.4	0.3	0.2	0.4
Intrauterine devices	42.0%	87.9%	0.3	0.2	0.4	0.6	0.5	0.7
Sterilization	NA	NA	NA	NA	NA	NA	NA	NA
Natural methods	5.9%	98.7%	0.1	-0.1	0.2	0.9	0.9	0.9
Abstain	26.9%	92.3%	0.1	0.0	0.3	0.8	0.7	0.8
No method recommended	98.5%	0.0%	0.0	0.0	0.0	1.0	0.9	1.0
Questions asked								
Contraceptive history	76.1%	33.5%	0.1	0.0	0.2	0.0	-0.1	0.1
Client age	69.9%	41.3%	0.1	0.0	0.2	0.0	0.0	0.1
Preferred method	74.0%	34.6%	0.1	0.0	0.2	0.2	0.1	0.3
Number of children	48.6%	65.3%	0.1	0.1	0.2	0.2	0.1	0.2
Last delivery	13.5%	90.2%	0.0	-0.1	0.1	0.6	0.6	0.7
Sexually transmitted infection status	40.1%	80.4%	0.2	0.1	0.3	0.3	0.3	0.4
Chronic illnesses	41.8%	64.0%	0.1	0.0	0.1	0.1	0.1	0.2
Currently breastfeeding	11.1%	94.7%	0.1	-0.1	0.2	0.8	0.7	0.9
Last menstrual period	39.2%	86.3%	0.3	0.2	0.4	0.4	0.4	0.5
Regularity of menstrual cycle	19.6%	93.6%	0.2	0.0	0.3	0.7	0.6	0.8
No. of current sexual partners	0.0%	98.5%	0.0	0.0	0.0	0.9	0.8	0.9
Has a partner	58.5%	58.9%	0.2	0.1	0.3	0.2	0.1	0.3

Partner attitude	10.9%	92.4%	0.0	0.0	0.1	0.5	0.4	0.6
Desire for more children	56.0%	65.6%	0.2	0.1	0.3	0.3	0.2	0.4
Conduct any exams	86.2%	57.8%	0.4	0.3	0.5	0.6	0.5	0.7
Blood pressure	75.0%	48.4%	0.2	0.1	0.3	0.3	0.2	0.4
Weight	69.6%	62.7%	0.2	0.1	0.3	0.3	0.2	0.4
Check for anemia	36.4%	82.3%	0.2	0.0	0.3	0.5	0.4	0.6
Pregnancy test	68.7%	56.8%	0.3	0.2	0.4	0.3	0.1	0.4

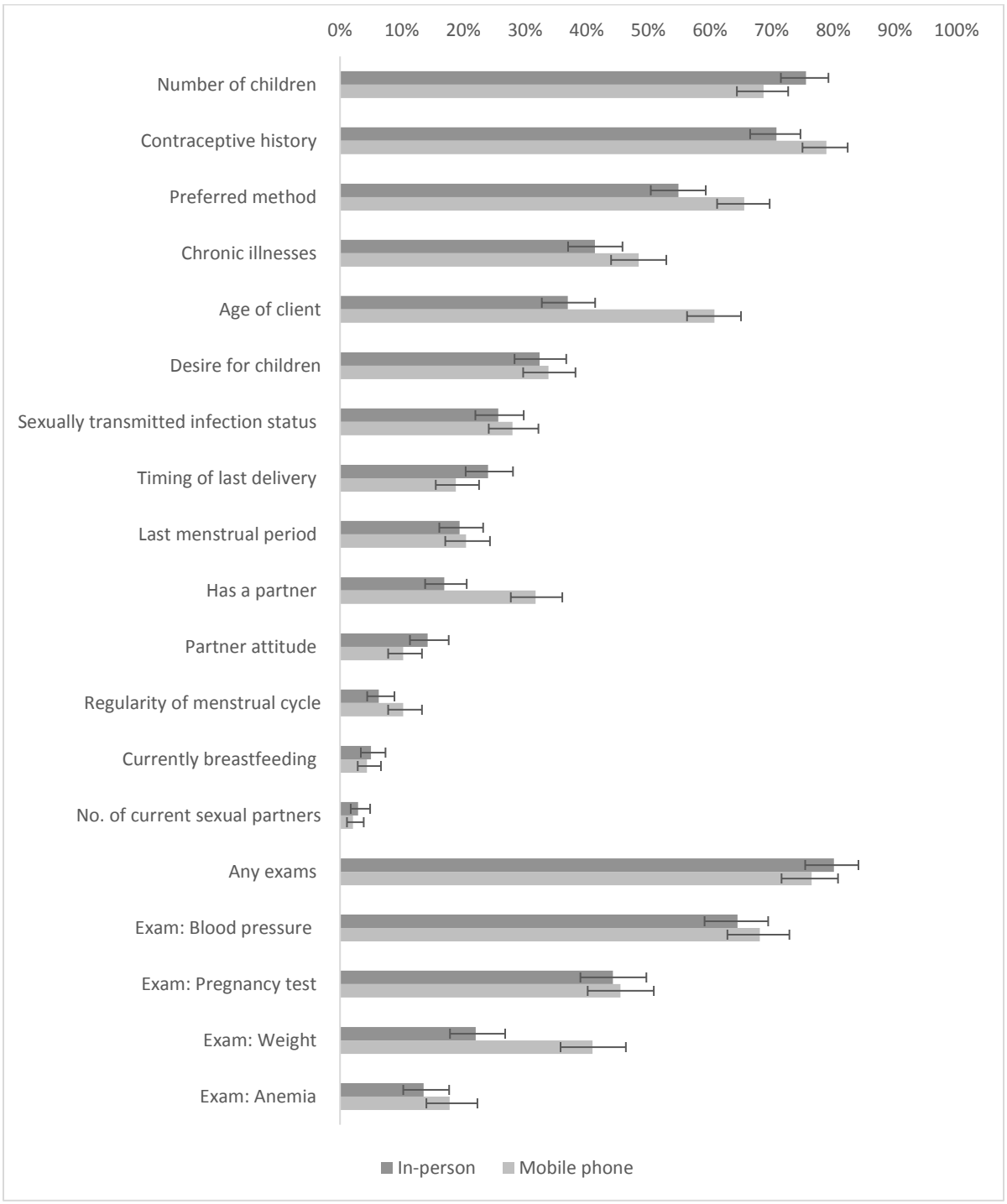
* Lower Limit; ¥ Upper Limit; ᴿ Prevalence Adjusted Bias Adjusted Kappa

Appendix G: Paper 3: Frequency of provider behaviors by case scenario

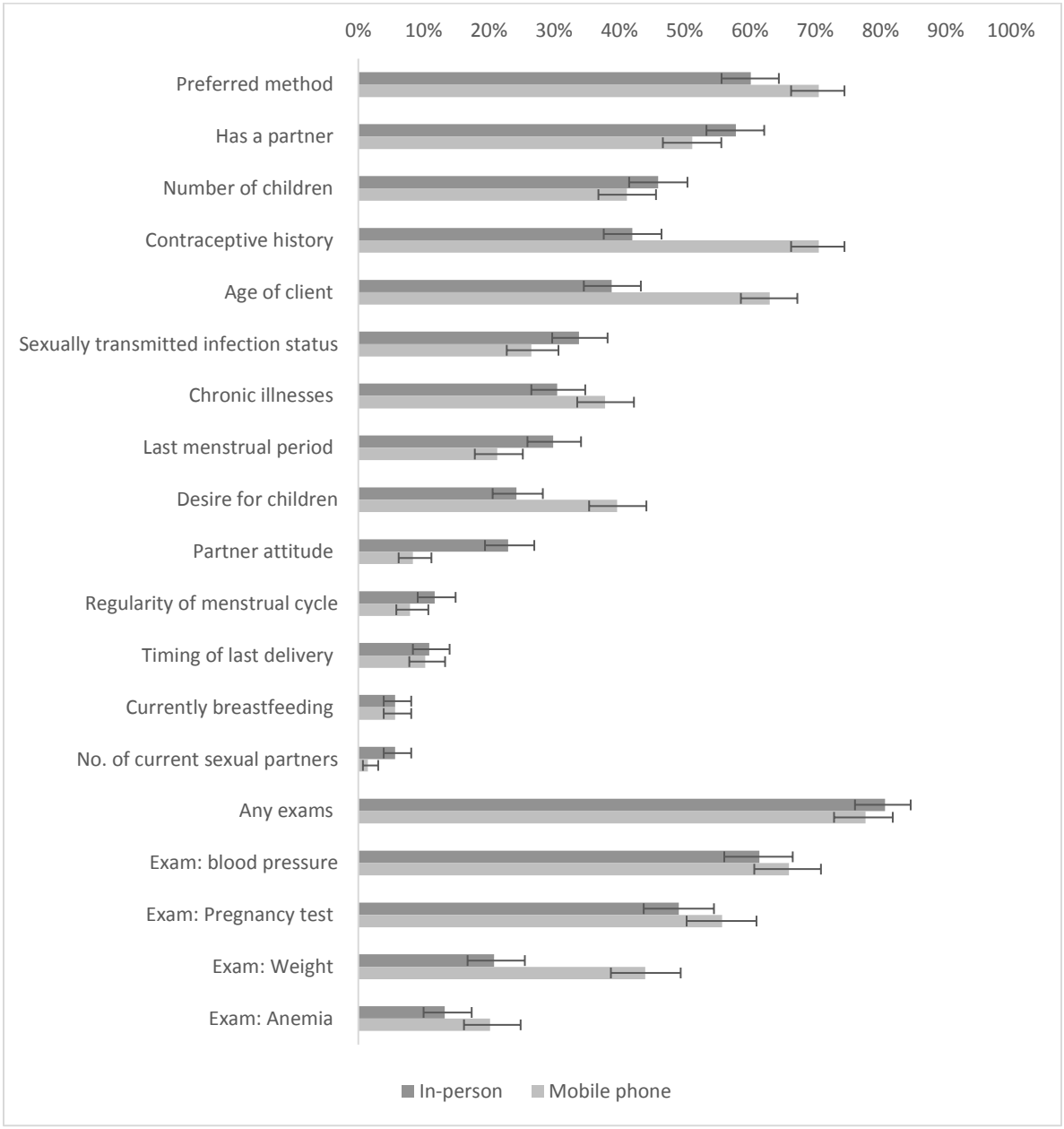
G1: Proportion of providers that asked client history questions and recommended exams for the **Married, adult with uncomplicated medical history case scenario**, in-person and mobile phone-based CVs (n=479)



G2: Proportion of providers that asked client history questions and recommended exams for the **Married, adult with complex medical history case scenario**, in-person and mobile phone-based CVs (n=479)



G3: Proportion of providers that asked client history questions and recommended exams for the **unmarried, adolescent case scenario**, in-person and mobile phone-based CVs (n=479)



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Curriculum Vitae

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EDUCATION AND TRAINING

Degree	Year	Institution	Field
Doctor of Philosophy	Defense: April 23, 2019	International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD	Global disease epidemiology and control
Master of Health Sciences	2007	International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD	Disease prevention and control
Bachelor of Science	2002	Beloit College, Beloit, WI	Evolution, ecology and behavioral biology

Certificates

- Vaccine Science and Policy Certificate. 2006. Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- Clinical vaccine trials and good clinical practices. 2006. Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

PROFESSIONAL EXPERIENCE

Position	Dates	Institution
Doctoral student researcher	Sept 2016 – ongoing	Johns Hopkins University, Bloomberg School of Public Health, Department of International Health, Baltimore, MD

Principal Responsibilities:

- Designed and implemented thesis-related research on family planning quality of care (currently writing thesis).
- Coordinated overall study on family planning quality of care in Malawi.

Position	Dates	Institution
Senior Research Associate	September 2015 – August 2016	Johns Hopkins University, Bloomberg School of Public Health, Department of International Health, Baltimore, MD

Principal Responsibilities:

- Extension of previous duties, promoted to Senior Research Associate

Position	Dates	Institution
Research Associate	April 2007 – August 2015	Johns Hopkins University, Bloomberg School of Public Health, Department of International Health, Baltimore, MD

Principal Responsibilities:

- Data manager and analyst for three independent, large-scale evaluations of child health programs in Sub-Saharan Africa.
- Head of the Data Management Unit for Institute for International Programs. Supervised two full time faculty positions and several Master students.
- Program and technical coordinator for a USAID-funded Translating Research Into Action (TRAction) study.

Position	Dates	Institution
Internship	Sept 2006 – Dec 2006	Johns Hopkins University and University of Cape Town, Cape Town, South Africa

Principal Responsibilities:

- Designed and implemented a pilot study on alcoholism and HAART adherence as part of a DOT-HAART clinical trial

Position	Dates	Institution
Research Specialist	Jan 2005 – July 2005	University of Wisconsin-Madison, Department of Medicine: Allergy and Asthma, Madison, WI

Principal Responsibilities:

- Promoted to research specialist. Extension of previous responsibilities, equipment management and quality control and writing of publications.

Position	Dates	Institution
Associate Research Specialist	June 2002 – Jan 2005	University of Wisconsin-Madison, Department of Medicine: Allergy and Asthma, Madison, WI

Principal Responsibilities:

- Laboratory study coordinator: human sample processing and analysis of cellular components, sterile tissue culture, purchasing/budgeting, literature review/synopsis and data management/analysis.

EDITORIAL ACTIVITIES

Peer Review Activities

- Journal of Global Health, November 2018
- Health Policy and Planning, June 2017
- BioMed Central Public Health, December 2016
- Tropical Medicine & International Health, May 2015
- Tropical Medicine & International Health, June 2018
- BMC Public Health, June 2017
- Globalization and Health, February 2016

Editorial Board Membership

- Editor for the Integrated Community Case Management of Sick Children in Ethiopia Supplement, Ethiopia Medical Journal, 2013-2014

HONORS AND AWARDS

2002 - Departmental Honors in Biology Department, Beloit College

2001 - National Center for Excellence in Women's Health internship award

1998, 1999, 2002 - Dean's List, Beloit College

2002 - Gertrude E. Sweet award for demonstrating leadership in confronting social issues in science

PUBLICATIONS

Journal Articles – Published peer reviewed

1. E. Hazel, E. Wilson, A. Anifalaje, T. Sawadogo-Lewis & R. Heidkamp. Building Integrated Data Systems for Health and Nutrition Program Evaluations: Lessons Learned from a Multi-Country Implementation of a dhis2-based System. J Glob Health. 2018; 8(2): 1-5.
2. E. Hazel, E. Chimbalanga, T Chimuna, H Nsona, A Mtimuni, E Kaludzu, K Gilroy & T. Guenther. Using Data to Improve Programs: Assessment of a Data Quality and Use Intervention Package for Integrated Community Case Management in Malawi. Glob Health Sci Pract. 2017; 5(3): 355-366.
3. E. Hazel, A. Amouzou, L. Park, B. Banda, T. Chimuna, T. Guenther, H. Nsona, CG. Victora & J. Bryce. Real-time assessments of implementation strength for community case management of

childhood illness: Validation of a mobile-phone based method in Malawi. Am J Trop Med Hyg. 2015; 92(3):660-665.

4. E. Hazel, J. Requejo, J. David & J Bryce. Evaluating Community-Based Treatment of Childhood Illnesses through Household Surveys. PLOS Med 2013; 10(5): 1-7.

5. E. Hazel, K. Gilroy, I. Friberg, R. Black, J. Bryce & G. Jones. Comparing the modeled to the measured mortality reduction: Applying the Lives Saved Tool to evaluation data from the Accelerated Child Survival Project in West Africa. Int J Epidemiol. 2010; 39 (Supplement 1):i32-i39.

6. J. Perin, J.S. Kim, E. Hazel, L. Park, R, Heidkamp & S. Zeger. Hierarchical Statistical Models to Represent and Visualize Survey Evidence for Program Evaluation: iCCM in Malawi. PLOS One. 2016; 11(12): 1-12.

7. N. Miller, A. Amouzou, E. Hazel, H. Legesse,T. Degefie, M. Tafesse, R Black & J Bryce. Assessment of the impact of quality improvement interventions on the quality of sick child care provided by Health Extension Workers in Ethiopia. J Glob Health. 2016; 6(2): 1-9.

8. M. Kanyuka, J. Ndawala, T. Mleme, L. Chisesa, M. Makwemba, A Amouzou, J. Borghi, J. Daire, R. Ferrabee, E. Hazel, R. Heidkamp, K. Hill, M.M. Álvarez, L. Mgalula, S. Munthali, B. Nambiar, H. Nsona, L. Park, N. Walker, B. Daelmans, J. Bryce & T. Colbourn. Malawi and Millennium Development Goal 4: Early Adopter; Early Achiever. Lancet Glob Health. 2016; 4 (3):e201-14.

9. A. Amouzou, E. Hazel, B. Shaw, N. Miller, M. Tafesse, Y. Mekonnen, L.H. Moulton, J. Bryce & R.E. Black. Effects of the integrated Community Case Management of Childhood Illness on child mortality in Ethiopia: A cluster randomized trial. Am J Trop Med Hyg. 2016; 94 (3):596-604.

10. M. Kanyuka, A. Amouzou, E. Hazel, R. Heidkamp, A. Marsh, W. Kachaka, T. Mleme, A. Jamali, S. Munthali, L. Park, B. Banda, L. Moulton , R.E. Black, K. Hill, J. Perin, C.G. Victora & J. Bryce. The independent evaluation of the integrated Community Case Management of Childhood Illness strategy in Malawi, using a national evaluation platform design. Am J Trop Med Hyg. 2016; 94(3):574-83.

11. T. Roberton, D. Kasungami, T. Guenther & E. Hazel. Monitoring iCCM: a Feasibility Study of the Indicator Guide for Monitoring and Evaluating Integrated Community Case Management. *Health Policy Plan.* 2016; 31(6): 759–76.

12. Amouzou A, Kidanu A, Taddesse N, Silva R, Hazel E, Bryce J, Black RE. Using Health Extension Workers for Monitoring Child Mortality in Real-Time: Validation against Household Survey Data in Rural Ethiopia. PLOS ONE. 2015; 10(11): 1-12.

13. Silva R, Amouzou A, Munos M, Marsh A, Hazel E, Victora C, Black RE, Bryce J and the RMM working group. Can Community Health Workers Report Accurately on Births and Deaths? Results of Field Assessments in Ethiopia, Malawi and Mali. PLOS ONE. 2015; 11(1): 1-15.

14. R. Heidkamp, E. Hazel, H. Nsona, T. Mleme, A. Jamali & J. Bryce. Measuring implementation strength for Integrated Community Case Management in Malawi: Results from a national cell-phone census. Am J Trop Med Hyg. 2015; 93(4):861-8.

15. N. Miller, A. Amouzou, E. Hazel, H. Legesse, T. Degefie, M. Tafesse, R.E. Black & J. Bryce. Assessing the quality of sick child care provided by community health workers. PLOS ONE. 2015; 10(11): 1-13.

16. C.G. Victora, A. Barros, P. Berman, Z. Bhutta, T. Boerma, M. Chopra, A. DeFrancisco, B. Daelmans, E. Hazel, J. Lawn, B. Maliqi, H. Newby & J. Bryce. Countdown to 2015: A decade of tracking progress for maternal, newborn and child survival. The Lancet. 2015; 387: 2049–59.

17. L. Pearson, E. Hazel & Y.Tam. Modeling potential reduction of child mortality after national scaling up of community based treatment of pneumonia, diarrhea, malaria and severe malnutrition in Ethiopia. Ethiop Med J. 2014; 52 (Sup. 3): 129-136.

18. D. Mamo, E Hazel, I. Lemma, T Guenther, A. Bekele, & B. Demeke. Assessment of the Monitoring and Evaluation System for Integrated Community case management (ICCM) in Ethiopia: A comparison against global benchmark indicator. Ethiop Med J. 2014; 52 (Sup. 3): 119-128.

19. N. Miller, T. Degefie, E. Hazel, H. Legesse, T. Tolera & A. Amouzou. Coverage and equitability of interventions to prevent child mortality in rural Jimma and West Hararghe Zones, Oromia Region, Ethiopia. Ethiop Med J. 2014; 52 (Sup. 3): 37-45.

20. N. Miller, A. Amouzou, M. Tafesse, E. Hazel, H. Legesse, T. Degefie, CG. Victora, RE. Black & J. Bryce. Integrated Community Case Management of Childhood Illness in Ethiopia: Implementation Strength and Quality of Care. Am J Trop Med Hyg 2014; 91(2):424-34.

21. A. Amouzou, O. Habi, K. Bensaid & the Niger Countdown Case Study Working Group. Reduction in child mortality in Niger: a Countdown to 2015 country case study. The Lancet. 2012; 380(9848): 1169-1178.

22. J. Bryce, K. Gilroy, G. Jones, E. Hazel, R.E. Black & C.G. Victora. A Retrospective Evaluation of Accelerated Child Survival and Development Project in West Africa. The Lancet. 2010; 375 (9714):572-82.

23. J. DeMore, E. Weisshaar, R. Vrtis, C. Swenson, M. Evans, A. Morin, E. Hazel, J. Bork, S. Kakumanu, R. Sorkness, W. Busse & J. Gern, Similar Colds in Allergic Asthma Subjects and Non-Atopic Subjects after Inoculation with Rhinovirus-16. J Allergy Clin Immunol. 2009; 124 (2):245-52, 252.e1-3.

Journal Articles and Editorials – Not peer reviewed

1. E. Hazel, J. Bryce and the JHU-iCCM Working Group. On babies, bathwater and designing programs for impact: evaluations of the integrated community case management strategy in Burkina Faso, Ethiopia and Malawi, a comment. Am J Trop Med Hyg. 2016; 94(3): 568–570.
2. D.R. Marsh, R. Nefdt and E. Hazel. Introduction to a Special Supplement: Delivering Integrated Community Case Management to Treat Childhood Illness at Scale in Ethiopia. Ethiop Med J. 2014; 52 (Sup. 3): 1-6.
3. R. Nefdt, D.R. Marsh, and E. Hazel. Conclusions: Delivering Integrated Community Case Management to Treat Childhood Illness at Scale in Ethiopia. Ethiop Med J. 2014; 52 (Sup. 3): 163-167.

TEACHING

Advisees

Name	Degree, University	Date	Role
Mary E. Morgan	Master of Public Health, JHSPH	2008	Capstone Advisor
Lois Park	Master of Science in Public Health , JHSPH	2013	Master thesis essay reader

JHSPH = Johns Hopkins Bloomberg School of Public Health

Teaching assistant positions

Course	No. credits	Date(s)	Department, University
Foundations of International Health	4	2018	International Health, JHSPH
Power and Sample Size for the Design of Epidemiological Studies	1	2018 & 2017	Epidemiology, JHSPH
Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle Income Countries	4	2018 & 2017	International Health, JHSPH

JHSPH = Johns Hopkins Bloomberg School of Public Health

PRESENTATIONS

Scientific Meetings

1. Expanding the DHIS2 web-based health information platform for integration and analysis of multi-sectorial data to improve monitoring and evaluation of MNCH&N programs. *Global Digital Health Forum*, 2016. Oral presentation.

2. Expanding the DHIS2 web-based health information platform to allow statistical analysis of multi-sectorial data for improved monitoring and evaluation of MNCH&N programs. *Global Symposium on Health Systems Research*, 2016. Oral presentation.

3. Use Case 6: National Evaluation Platform for evaluating complex interventions. *DHIS 2 Symposium for iNGOs 2016.* Oral presentation.

4. The State of Maternal, Newborn and Child Health: Presentation of the key findings from Countdown to 2015. *Saving the Lives of Women Children and Adolescents. American Public Health Association*: Webinar. December 10th, 2015. *https://www.apha.org/events-and-meetings/apha-calendar/webinar-events/saving-the-lives-of-women-children-and-adolescents*

5. Independent impact evaluation of integrated community case management in two zones of Ethiopia. *American Society of Tropical Medicine and Hygiene Conference 2013. Oral presentation and panel member.*

6. E. Hazel, K. Gilory and J. Callaghan. Tracking Contextual Factors in large-scale, "real-life" evaluations of child survival programs in Africa. *American Evaluation Association Conference 2009*. *Oral presentation*

7. E. Hazel, A. Amouzou, L. Park, B. Banda, T. Chimuna, T. Guenther, H. Nsona, C. Victora and J. Bryce. Measuring the strength of community case management implementation: Validation of mobile phone interviews with community health workers in Malawi. *American Society of Tropical Medicine and Hygiene Conference 2013. Poster presentation*

8. Implementation Research Embedded in Integrated Community Case Management Program: Improving Data to Improve Programs (CCM-IDIP) Working Group (J. Bryce, E. Chimbalanga, T. Chimuna, K. Gilroy, T. Guenther, E. Hazel, A. Mtimuni, H. Nsona. Improving data to improve programs: implementation of a data use package as part of the community case management program for common childhood illnesses in Malawi. *American Society of Tropical Medicine and Hygiene Conference 2013. Poster presentation*

9. E. Hazel, R. Vrtis, C. Swenson, J. Gern, W.W. Busse, Nasal Cytokine and Inflammatory Responses to an Experimental Rhinovirus (RV) 16 Infection**.** American Thoracic Society Conference 2005. *Poster and oral presentation*

10. R. Vrtis, E. Hazel, J. Gern and W. Busse. MUC5AC Gene Expression in Upper and Lower Airway Samples Following Experimental Rhinovirus (RV) 16 Inoculation. American Academy of Allergy Asthma and Immunology Conference 2005. *Poster presentation*

11. G. Brooks, E. Hazel, R. Vrtis, K. Buchta, J. Bernstein, C. Swenson, A. Mosser, J. Gern, W. Busse. Increased Sputum Interferon Gamma Production in Asthmatic Patients during Rhinovirus Infections. American Thoracic Society Conference 2004. *Poster presentation*